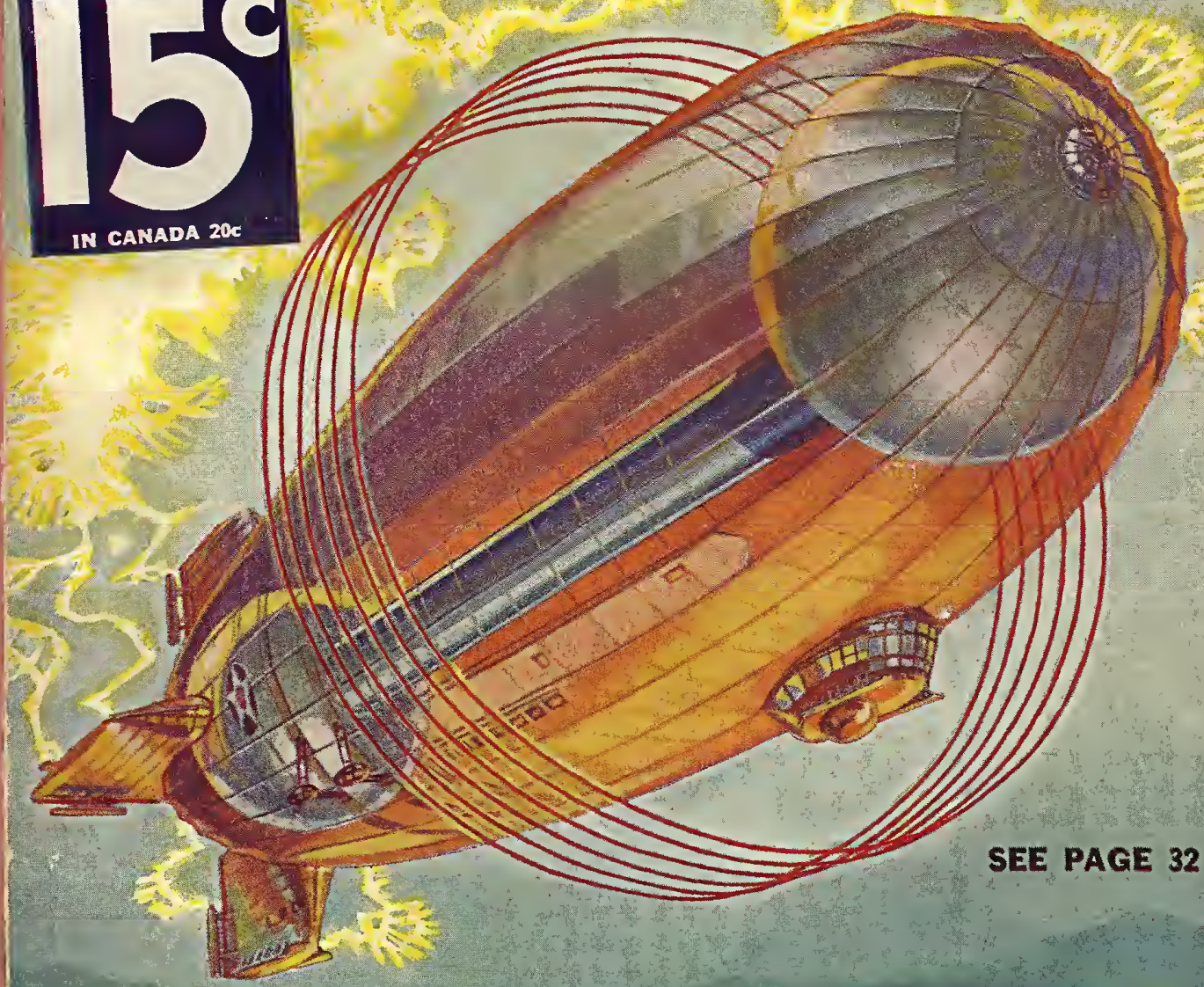
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NOW 15c

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15 CENTS

MODERN MECHANIX and INVENTIONS

JULY 1933

What Will You Do With $3,500.00 Cash If I Give it to YOU?



I WILL PAY $250.00

JUST FOR THE WINNING ANSWER TO THIS QUESTION

I am going to give $3,500.00 to some deserving man or woman who answers my announcements. **You may be the one to get it!** But, before I give it to anyone, I would like to know that the money will be used wisely. WHAT WILL YOU DO WITH THIS FORTUNE IF I GIVE IT TO YOU? Just answer this question—tell me in a sentence of 20 words or less what you would do with the $3,500.00 — **nothing more to do toward the $250.00 cash prize!** It is so simple! The first answer that comes to your mind may win the prize. Nothing "fancy" is needed—just tell me in plain words what you would do with the $3,500.00.

20 SIMPLE WORDS WIN $250.00

Nothing More for You to Do!

Costs nothing to win, nothing to buy—no selling—no puzzles —$250.00 Prize given just for an answer to my question

There is no way you can lose. Simply tell me what YOU will do with $3,500.00 if I give it to you. The prize for the winning answer is $250.00. Just sending an answer qualifies you for an opportunity to win $3,500.00 in final prize distribution. Think what an amazing opportunity—why, many people work hard for a life-time without ever having such a vast amount of money as you may now win.

Think, NOW, How You Would Spend $3,500.00

Would you start a business of your own; would you invest in bonds; would you pay off a mortgage on your home or buy new furniture and clothes? Maybe you would use the money for education. Just think what $3,500.00 could mean to you! Think of all the things you could do with it. Plan now—then write your answer—rush it to me at once. Yours may easily be the winner.

BE PROMPT! I Will Send You $1,000.00 Cash Certificate AT ONCE!

One thousand dollars EXTRA if you are prompt and win first prize in final distribution. So don't delay. EVERY PERSON WHO TAKES AN ACTIVE PART WILL BE REWARDED IN CASH . . . Think what you would do with $3,500.00—write your answer and rush it to me. BE PROMPT. I will send you $1,000.00 Cash Certificate AT ONCE.

Hundreds Have Won

Throughout the past year we have given financial help to hundreds of deserving people in all parts of the United States . . . we have given away hundreds and thousands of dollars in prizes. D. Beemer won $4,700.00. J. Walsh won $5,000.00. Hundreds more made happy with huge prizes and cash rewards. Now is your opportunity—**Act today!**

RULES

Only one answer accepted from a family. Use your own name. You must be over 16 years of age and reside within the Continental U. S. $250.00 given for best answer to **"What Will You Do With $3,500.00 If I Give It To You?"** Answers must be postmarked not later than Sept. 16, 1933. Judges will consider answer only for practical value of the idea. Construction, spelling, neatness or ingenuity of submitting answer not considered. Duplicate prizes will be given in case of duplicate winning answers.

TOM WOOD, Manager
H-O Bldg. Dept. WA-53-G Cincinnati, Ohio

Just Sending Answer Qualifies You for Opportunity to Win $3,500.00

Some say I am wrong. They say that giving money to people will not help to bring back prosperity. They say that the people who get money from me will spend it foolishly. Now I want to find out. I am going to give away over $6,000.00. Someone is going to get $3,500.00, all cash. If I gave you the $3,500.00 what would YOU do with it? Tell me in 20 words or less. Just sending an answer qualifies you for the opportunity to win $3,500.00. If you are prompt, I'll send you a $1,000.00 Cash Certificate AT ONCE! Here is an opportunity of a life-time. Costs you nothing to win. Rush your answer today. Send no money—just tell me what you would do with the money if I gave you the $3,500.00 that I have promised to give to some yet unknown deserving person.

Tom Wood

Use Coupon—Mail in envelope or paste on 1c postal

$250.00 PRIZE COUPON

TOM WOOD, Manager
H-O Bldg., Dept. WA-53-G, Cincinnati, O.
If you give me the $3,500.00 prize I will use it as follows:
Write your answer here, in 20 words:

.....

.....

.....

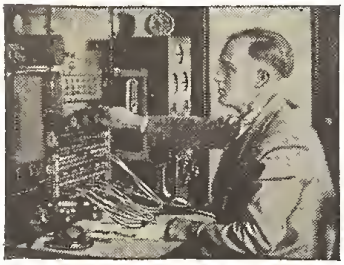
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Address

Town..... State.....

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Jobs in Broadcasting Stations are fascinating, interesting, and pay well.



Set servicing has paid many N. R. I. men $200 to $1,000 a year for their spare time. Full-time men make as much as $40, $50, $65 a week.



Television, the coming field of great opportunities, is covered in my course.

I'll train You Quickly for Radio's GOOD spare time and full time Jobs . . .

Mail Coupon for FREE Information

Why slave your life away in a no-future job? Why skimp, why scrape trying to pay your bills? I'll train you quickly for the live-wire field—the field with a future—RADIO. $50, $60, $75 a week—that's what many Radio Experts make. $5, $10, $15 a week extra money—that's what many of my students make in their spare time shortly after enrolling. My free book tells you about Radio's spare-time and full-time opportunities—about my tested training—about my students and graduates—what they are doing and making. Get this book. Be a Radio Expert. The Radio field is big enough to absorb many more properly trained men.

I'll train you for jobs like these

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Save—Learn at home in your spare time

You don't have to leave home and spend $500 to $1,000 to study Radio. I'll train you quickly and inexpensively right in your own home and in your spare time for a good Radio job. You don't need a high school or college education. Many of my successful graduates didn't even finish grade school. My amazingly practical 50-50 method of training—half with lessons, half with Radio equipment—gives you broad practical experience—makes learning at home easy, fascinating, practical and rapid.

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Your money back if not satisfied

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Act today. Mail the coupon. My 64-page book will be sent free to any resident of the United States or Canada over 15 years of age. It tells about Radio's opportunities—explains the eighteen star features of my course—shows letters of what others are doing and making. There is no obligation. Mail the coupon.

J. E. SMITH, President, National Radio Institute
Department 3GH, Washington, D. C.

Here's Proof

"Made $6,000 in 2 Years"



"Soon after the depression started, I found myself without a job, but I was well protected with N. R. I. training. I swung right to full-time Radio servicing and I have made over $6,000 in a little over two years." —WM. SPARTIVENT, Sparty Radio Service, 93 Broadway, Newark, N. J.

"$500 a Year in Spare Time"



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"Good Position, Good Pay"



"I am Chief Operator at Radio Station WSMK. This is a good position with good pay. I have advanced in Radio right along. I recommend N. R. I. to anyone who wants to be successful in Radio." — JOHN HAJDUK, JR., 3 Broxey Apts., Southern Hills, Dayton, Ohio.

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Operator in Broadcast Station.
Aircraft Radio Operator.
Operator of Airway Beacons.
Service Man on Sound Picture Apparatus.
Operator of Sound Picture Apparatus.
Public Address Systems.
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Service Manager for Retail Stores.
Auto Radio Installation and Service Man.
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Set Servicing Expert.



Sample Lesson FREE

I'll send you a Free Lesson to prove that my Radio Course is easy, practical. That's how confident I am that I can train YOU at home in your spare time to become a Radio expert. Only my students could have this book in the past. I KNOW that when you see it, read it, examine it, you will be delighted with its clear, simple way of teaching Radio. I KNOW—because I have already trained thousands of men. Many of them with not even a grammar school education, and no Radio or electrical experience, have become Radio experts and earn two or three times their former pay. Mail the coupon now.

ACT TODAY

J. E. SMITH, President
National Radio Institute, Department 3GH
Washington, D. C.

Dear Mr. Smith: I want to take advantage of your Special Offer. Send me a sample lesson, "A Bird's-Eye View of Radio" and your book, "Rich Rewards in Radio." This request does not obligate me. (Please print plainly.)

NAME.....Age.....

ADDRESS.....

CITY.....STATE.....

"R"

JULY, 1933

VOLUME X
NUMBER 3

MODERN MECHANIX AND INVENTIONS

Donald G. Cooley
EDITOR

PRICE 15 CENTS
(20 CENTS IN CANADA)

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"I can't think of a job that offers better pay or working conditions. And there's nothing monotonous about a Draftsman's work—every day brings some new problem. It makes me feel that I'm doing something big and worth while.

"What finally got me to take up Drafting was finding a friend at his Drafting table, doing some special work at home. When he told me his firm was planning ahead for the business pick-up, and keeping its Drafting force busy, I made up my mind that Drafting was a mighty good line to get into.

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THE UNIVERSITY OF THE HOME

Dept. DB-33, Drexel Ave. at 58th St., Chicago

You may send me, without obligation, Drafting lesson, student list, and "Selective Employment Service."

Name..... *Age*.....

Address

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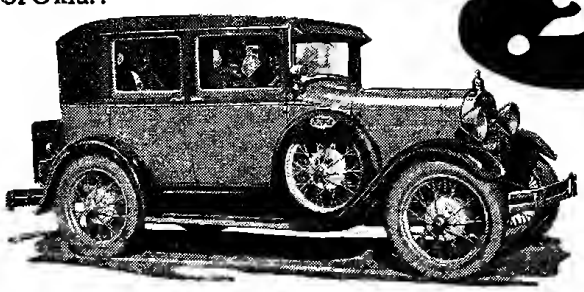
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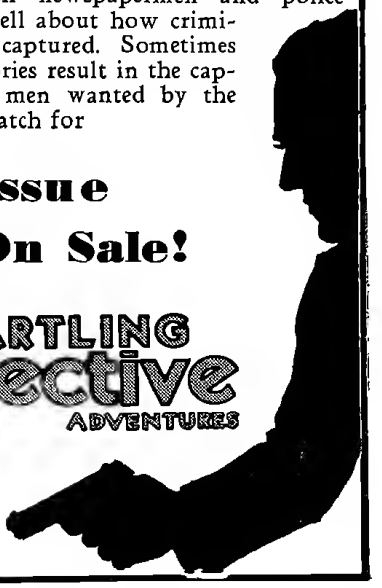
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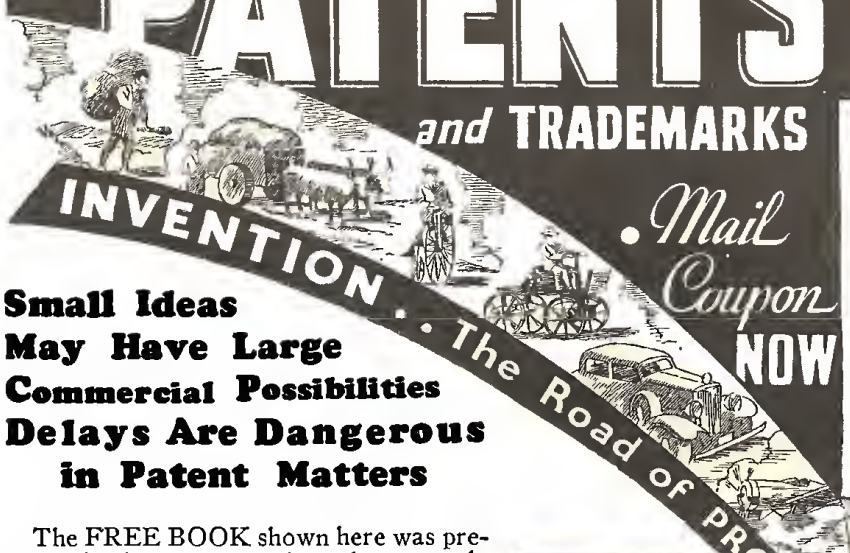


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3172 Adams Building, Washington, D. C.

Please send at once your book, "How to Obtain a Patent" and your "Record of Invention" form.

NAME.....

ADDRESS.....

.....

(Be sure to write or print name clearly)



A good example of too much airplane and too little motor. A 600-pound low wing seaplane powered with a Heath Henderson that has not yet flown. Gene Shank is the jockey. Don't shoot me for telling on you, Sam.—Andy.

Andy's Shop Mail Box

Andy kicks his pet pig out from under foot and finally at the last minute makes the book with his always-absorbing column of Gang doings, the while Parachute chases meadowlarks off the tarmac.

WHAT Ho, Gang! Here it is Summer in earnest and me not yet over my spring fever. Nor that pig Parachute either. He's as frisky as Humpty Dumpty, and shags meadow larks all over the Tarmac. Some incoming ship is going to make pork sausage of him yet, but I've got other things to worry about what with this month's stuff a little late and the eds giving me the jingle every ten seconds. Ho hum, wot a swell life!

* * *

Here's something along the line I've been hearing considerable of, lately. Glimpse and then gulp:



Dick Eichorn's version of All Sorts. She is used on the Pacific at Seal Beach, Cal., she is—well, Dick likes her.

Marysville, Kans.

Dear Andy:

Just a word to let you know I am another victim that has to stumble through your columns to see if there is any boat dope there, of course I don't like to be hoggish but give us boat bugs a break, and get more stuff in on small power boats. Last summer yours truly managed to scratch together a 16 ft. canvas canoe and after a few trips using the strongarm method, decided to motorize, so got hold of an old Maytag washer motor and gave it a working over and installed it direct drive with an 8 in. prop. and boy did it work. In still water she makes 15 mi. per hr. but in going up against swift riffles you have to watch the bank pretty close to tell whether you are moving or not but she gets over and that's all that is necessary. If any of the fans want the plans I can fix them up. Inclosed is 50c for the book (How to Build 20 Boats), so fire it along as I need ideas like a drowning man needs water. Don't suppose I'll be lucky enough to bust into print but here's hoping.

Yours till the boat sinks,

C. L. Miller.

* * *

Not enough boats, eh, Gang? Well, this bein' a beeyootiful summer morn, with the wimpling blue waters of Twin Lakes wimpling their best wimples right up alongside the edge of the field, I got the boat feever too. And so to head the column this month I will shoot you a dose to last all summer: so pipe this next about All Sorts.



Persevering in spite of bone-headed Government regulations, Le Roy Tyler, of New York, built himself this splendid version of Ed Heath's Parasol. Looks like the grass is a little long for easy take-offs, Le Roy. How'd you like our castings?

Out from the land of earthquakes comes another shock. It is Dick Eichhorn's version of "All Sorts," that popular little utility dinghy which is described bolt for plank in How to Build 20 BOATS.

We'll let lovers of the original All Sorts write Dick personally and tell him what they think of him for forgetting to follow the stem profile, substituting what appears to be straight stick stem, and for carrying the topsides up like the wall of a mountain, so that Dick won't feel hurt at us. For he's a right good guy and we thank him heaps for taking the boat by the horns, so to speak, and sending us the shots of his All Sorts.

Box 1337
Seal Beach, Calif.

Andy:

Received your letter of February 7 and am wondering at my dumbness for not sending you a pix of my version of "All Sorts" in the drink, so you will find some enclosed here.

I haven't been myself lately (I don't know who I am) as I've been working out some dope on a composite V type engine that's simple to compose and simpler to assemble. This engine develops up to 60 h.p. at 3000 r.p.m. and weighs 162 lbs. ready to fly away. This job is composed of 4 Harley 74 barrels and a Model T Ford crankshaft, also the Harley pistons.

The above job, although not widely known, is a proven motor having Dept. of Commerce O.K. and all necessary qualifications. Please understand, I have nothing to sell although if a self addressed envelope is enclosed I'll be glad to put anybody in touch with the man who has the block casting, and the rest is a matter of assembly.

In the event you would like to hear more of this I'll send the complete dope along with pix. I'd just like to pass along anything of this nature that comes under these watchful orbs. As ever,

R. H. Eichhorn.

There you are Dick. And as man to man I know you're pal enough to stand for a mite of good natured banter about this. It is terrifying to sit at the edge of the old hangar cot and see some of the re-designed jobs that do come in. Your alterations no doubt are oke for your service, but gee, guy, when a designer goes to the headwork of building and testing a design and putting years of experience in it, why oh why doesn't somebody follow the plans?

I give up.

Too much moanin' about things like this is bad for the morale of every one of us, from the pig right down to humble me, so I'll save that revamped, re-designed flip-flopped picture of a thing that was maltreated out on the West Coast until next loading of the old blunderbuss.

Along with a three-cent Government printed picture of George Washington comes this letter from Ralph Springer, who has designed and built himself a lovely little sailing canoe, with bat-wing sails. Look how she ghosts along with seemingly no wind at all to help her.

(Continued on page 12)



Ralph Springer, of Cleveland, Ohio, built himself this lovely little bat wing sailing canoe. Isn't she a beauty?



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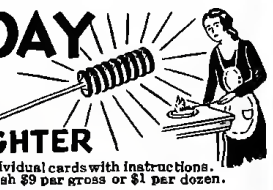


DR. W. D. SMITH
INVENTOR

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ANDY'S SHOP MAIL BOX

(Continued from page 11)

Cleveland, Ohio.

Dear Andy:

I am inclosing some snapshots of a canvas covered boat I built late last summer.

I was short on cash but long on ambition so built it from a couple of packing cases, two boards I "swiped" from the coal bin door and an old "Tarp."

She's a "vee" bottom job and is 10 feet long by 30 inches beam and weighs less than 50 lbs.

She's very seaworthy, and in a good breeze will pass up most of the outboard propelled row boats around the park where I sail it mostly.

These snapshots were taken in December and old Lake Erie was kind of choppy outside the breakwall. You can see by the wake that the boat goes right along.

I started reading M-M in the Heath Parasol days and haven't missed more than one or two since. I think it and the "Pack Mag" are the two best on the market.

Unless this job of Jack Hanna's "Tahiti," that you mentioned looks better when it comes out, I think I'll save my nickels for Sam Rabl's "Buddy," for my next boat.

Hoping I can see one of my snaps in some future number,

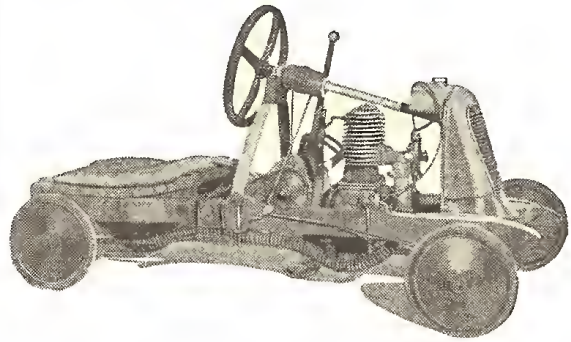
Sincerely yours,
Ralph D. Springer.

P.S. I am inclosing a stamp so if the snaps are not acceptable they won't go into the waste basket. R.S.

—which makes us richer by one good letter, one swell snapshot, two compliments, and a three-cent stamp. Thassa kinda guy I like to hear from!

* * *

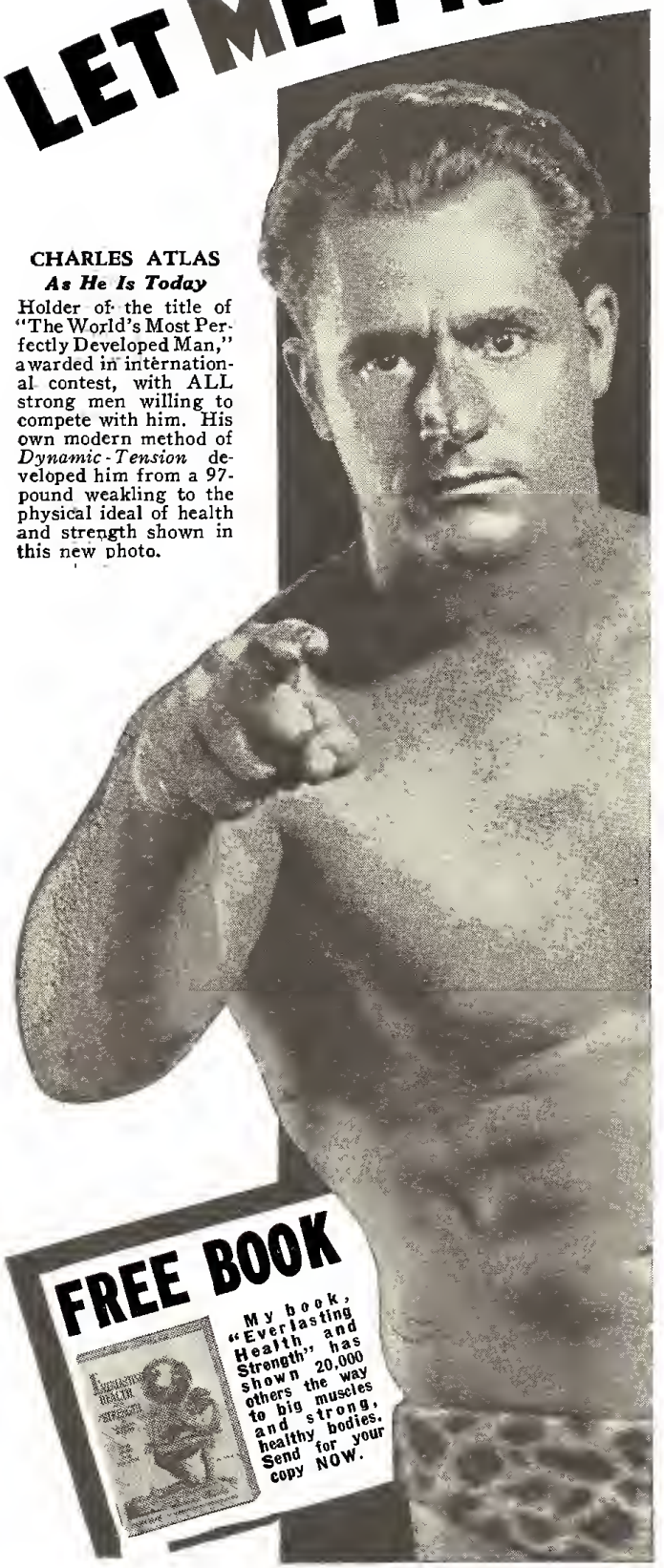
Only upon rare occasions does this doddering old typeslinger allow the dignity of this colyum to be encroached upon by stooping to free puffs for manufacturers. But here's one that benefits everybody, particularly if you want a complete home workshop of the inexpensive variety: Outboard Motors Corporation of Milwaukee, Wisconsin, invite you to drop a line about their new tool that has everything from a lathe to a hand saw on one shaft.



Wouldn't you like to know who built this, what it is and all about it? So would Andy. So I'm running the pic as a pic to end all pix sent in to me anonymously. Who did this? Write and all will be forgiven, sweetheart.

(Continued on page 14)

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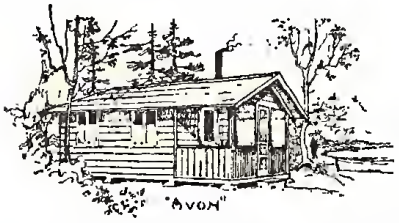
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Lake Cabin Plans

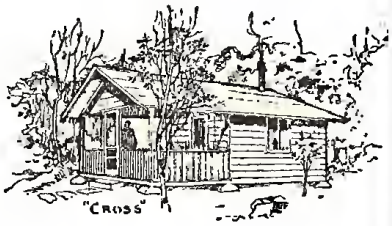
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"AVON"



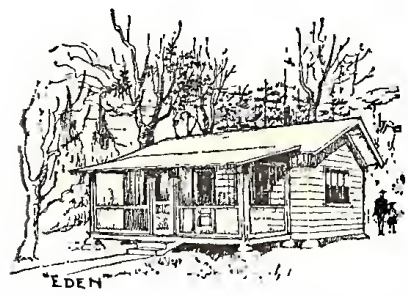
"Avon" cottage is 12x20, including porch. Living room 12x14½ to accommodate two single beds. Estimated cost of materials, taking advantage of present-day market prices, is $95. If you hire a carpenter to build "Avon," the cost should run around $240. Blueprints consist of a set of four, each 16x26 inches done to a scale of ½-inch to one foot. Primary aim of this series of plans is to obtain lowest cost with sound consttuction, using standard materials. Price of blueprints, including bill of material..... **$2.50**

"CROSS"



Including the porch, "Cross" cottage is 16x20. The living-room is 12x16, arranged for two beds. Estimated cost of materials, $115; cost complete if you hire it built, $310. Plans of all cottages show use of insulating board if you want to use the cabin as a hunting lodge in fall ot winter. Blueprints of "Cross" consist of a set of four, sent postpaid with complete specifications and bill of material for **$2.50**

"EDEN"



Outside dimensions of "Eden" are 22x24. The main part is 14x24, containing the living room, and there are two bedrooms, each of which will hold two single or one double and one single bed. Two closets with plenty of cupboard space and a breakfast nook. Estimated cost of materials, $200; cost if you hire it built, $600. Blueprints for "Eden" contain six to a set, each 16x26 inches, giving complete specifications and bill of material.
Price postpaid **$4.00**

A special fireplace blueprint, showing consttuction of an ideal cabin fireplace, with full directions, is available at **$1.00**

There are four other cottage plans in this series, not shown above. "Bard" is 12x24, costs $110 for materials; "Dream" is 16x24, including porch, materials cost $125; "Forest" is 20x40, with fireplace, materials cost $400; "Nautilus" is a cabin that grows with additions, full size materials cost about $450. Address orders and inquiries to

MODERN MECHANIX AND INVENTIONS
Blueprint Department
529 S. Seventh Street, Minneapolis, Minn.

ANDY'S SHOP MAIL BOX

(Continued from page 12)



Bill Kehne, of St. Paul, (everybody knows where St. Paul is) made this realistic model.

The werry snoozy little model river steamer shown in the adjacent cut is one built by Wm. J. Kehne, 780 Curfew Ave., St. Paul, Minn. Geev it a look:

780 Curfew Ave.
St. Paul.

Dear Sirs:

These small photos are of my 48 inch model stern wheeler which I developed. A brief description of this boat was given in "The Model Maker" for April, 1932, but if it would be of any further interest to your readers you are welcome to any information.

The boat may be seen and inspected at above address.

Yours truly,
Wm. J. Kehne.

* * *

There now, Mr. Miller, and all you gents who haven't been seeing enough wet stuff in this sunlit corner of pied type will have to rest content for the time being while the wheel specialists are pandered to.

But just before I leave, for drier subjects, let me advise you that John Hanna's much heralded and long looked for **Tahiti**—round the world cruising boat, will shortly be run. You men in far parts where the water is deep and wild will want one of these, even if it takes you five years to build her and you accumulate the material stick by stick. I haven't been wrong on a prediction yet, have I?

* * *

After the first real spring thaw and dry-up Sam Wing made his way across the field to the hangar with two letters he thought all readers of the deah ol' almanac would like to see. One of 'em concerns model speed boats, which are wonderfully popular with model boat fans, and the other is anent a baby cyar. Good word that, anent. Dunno what it means but she sure do sound swell:

2902 Olive Street,
Huntington Park, Calif.

Dear Sir:

Received your letter asking for some snap-

(Continued on page 16)

PATENTS



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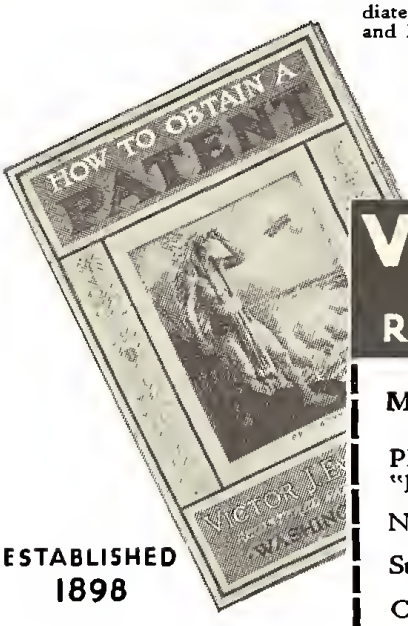
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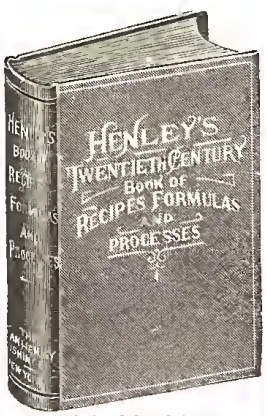
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ANDY'S SHOP MAIL BOX

(Continued from page 14)

shots of my hydros. I am very pleased to send what snaps I have and you will find enclosed two shots of my first attempt at building really fast model hydros. Sorry I do not have any action shots of it, as a fellow gets pretty excited when running a boat such as this and in consequence forgets all about taking a picture of it. I have taken a camera every time I run the boat, but that's as far as it goes.

Now as to the boat, I will give you a short description of it. The hull is made of mahogany of approximately 1/16" in thickness of three-ply stuff and is fastened with brass screws all over. There are no frames, only ¼" strips at the chine, top and transom and these are of spruce and of course are ¼" square similar to "Elmara's" hull. The bottom is flat and is similar to an outboard hydro of large size, very little free board as can be seen. The bottom is mahogany, instead of aluminum as in "Elmara." The step is very small, being ½" high. The length is 35"x12¼" beam. As can be noted, there are sort of bumpers forward. These are put on to keep the spray out of the boat and does it do its job? It does! There are two step ventilators as can be seen sticking up through the deck forward and looking as though they are ventilators on a large runabout. Now as to the power plant. Steam engine is 2-cylinder—½" B.x½" S.—Water pump—3/16" B.x variable stroke. There is no oil pump, instead there is a lubricator placed above the engine as can be seen. This has been alright, but on a larger plant I suggest a pump. (Can't forget to turn it on anyhow.) Boiler contains 25' of 3/16" copper tubing. Weight of boat is 7½ lbs. Prop is 2½" diam. x 12" pitch. The speed is about 25 miles per hour, which is, I think, fairly good for its size. It planes perfectly and runs very steady with quite a rooster's tail behind it. I guess that's all there is to it, so will say adios for this time.

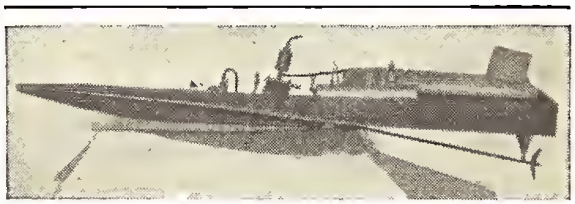
Sincerely,
Cyril Smith.

P.S. Its name is "SCRAM!"

— — — thanks worlds, Cy. A concise and informative missive which all of us appreciate.

I suggest that you make up a set of blueprints on this, Cy, and sell 'em to the inquirers for a dollah. They'd be worth five times that to a real dyed-in-the-wool model boat bug.
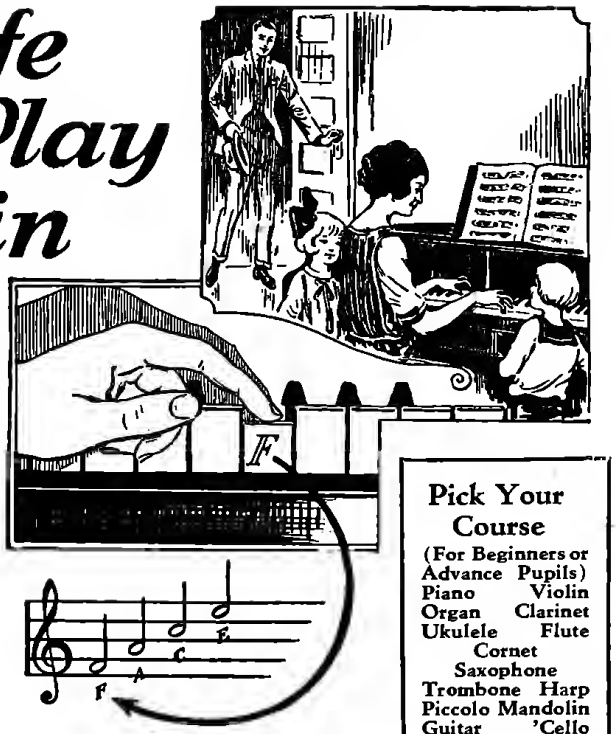
(Continued on page 23)



Here's a miniature steam powered hydroplane built by Cy Smith, of Oakland, Cal. Cy is quite a boat bug, and tells about her in his letter. Similar plans ran in Packmag No. 2.

How My Wife Learned to Play the Piano in 90 Days

A husband's story of the fulfillment of a life-long wish—by a new, easy, spare-time method which has brought the joy of music into thousands of silent homes.



FROM boyhood I vowed that if ever I had a home of my own there would be music in it. No wife for me unless she could play some instrument, and play it well.

But one day Beth came along, knowing not one note from another, and Beth is Mrs. Taylor today. A piano graced our new home, but somehow the old vow was forgotten, and stayed forgotten until Jimmy Jr. and Beth No. 2 were quite some youngsters.

Then along about the time the novelty of parenthood began to wear off a bit, the yearning for music came back. And one evening I spoke out, "Beth, I'd give a hundred dollars if you could play something—piano, violin, banjo, ukulele—*anything.*" Beth looked so hurt I was ashamed of myself, so I said no more.

About three months later I got home early one night, and heard the old piano come to life—first a little jazzy piece, then a sweet plantation melody. And there at the piano was Beth, playing, and the two kiddies beating time! She saw me, and stopped. "Oh," she cried, "I'm so sorry!" "Believe me, I'm not," I shouted, and I grabbed the whole family up in my arms.

"But, Jim, I wanted to wait and surprise you when I could really play. I'm learning fast, but it's only three months since I found out"—"Found out what?" I said. Beth began to cry. "I know!" Jimmy Jr. piped up. "Mother found out the way to learn music just like I am learning to read in school—only lots easier."

Well, that musical party lasted all the evening. It was a howling success.

Jimmy Jr. had told the truth; the method Beth had found was so easy that anyone could learn it. By this method the U. S. School of Music, the largest in the world, has already trained over half a million people, teaching the playing of any musical instrument almost in the same way a school child learns to read.

When first learning to read you look at every letter separately, and spell out every word, c-a-t, m-a-n. Later you do not see the letters; you see the words as units, "cat," "man." By and by longer words become units to you, and you find that whole *expressions,* like "up the steps," "on the train," no longer are seen as separate words, but immediately at an instant, without spelling, without thinking words, you see each expression in the unit form.

The alphabet of music follows the alphahet of language. Each note is a letter, and playing is practically spelling the notes together correctly. The first note on the staff above is F. Whether you sing or play, it is always F. The four notes shown above are F-A-C-E, easy to remember because they spell "face." Certain strings on mandolin, certain keys on piano, certain parts of all instruments, are these same notes. Once you learn them, playing melodies is a matter of *acting* what you *see!* You play almost before you realize it—and every step is real fun, fascinating, simple, interesting, almost too good to be true.

Remember, neither my wife nor most of the half a million other musicians trained by this method knew anything about music. Beth learned to play the piano; she could have learned any other instrument. Jimmy Jr., is now taking up violin, and my daughter is learning singing. Right at home, no costly teacher, no classes at inconvenient hours, no useless study and practice. No numbers, no tricks, no makeshifts. But a sound, quick musical education, learning by *notes. Anyone* can *learn any* instrument or sing this way.

When I told Beth I was writing this out to put in a magazine, she told me to be sure and say that the school will gladly send a free book explaining everything, called "How You Can Master Music in Your Own Home." The book is free, asking for it obligates you not at all—but you should send for it right away before all copies are gone.

JAMES W. TAYLOR.

Mr. Taylor is enthusiastic. He has a right to be. Yet when you read the facts in our free book you will appreciate that his opinion is *conservative.* The booklet not only gives you full information about the U. S. School method, but also tells you all about the amazing new *Automatic Finger Control.* You, too, can easily learn to play your favorite instrument or to sing.

Mail the coupon below to the U. S. School of Music, 2627 Brunswick Building, New York City. Or send a postcard. But act at once. Do not delay.

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Voice and Speech Culture
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Please send me your free book, "How You Can Master Music in Your Own Home," with inspiring message by Dr. Frank Crane, Free Demonstration Lesson and particulars of your easy payment plan. I am interested in the following course:

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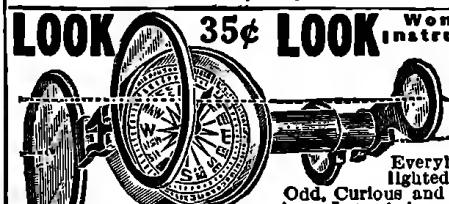
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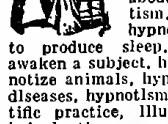
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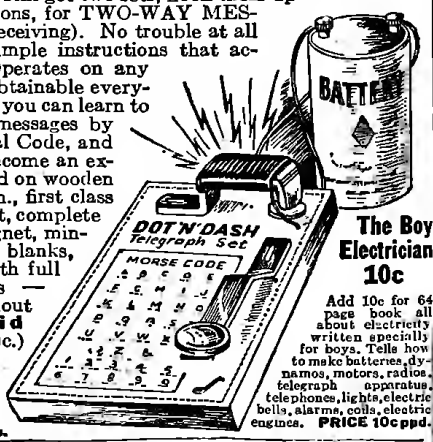
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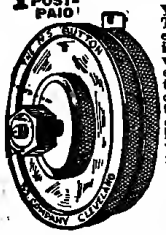
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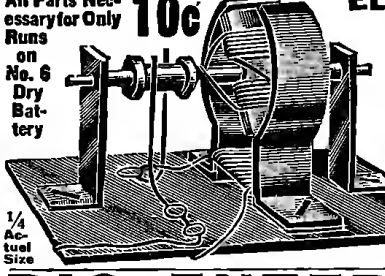
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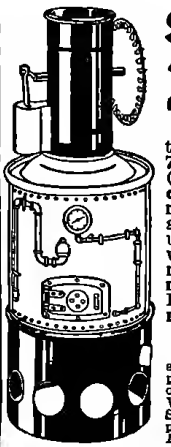


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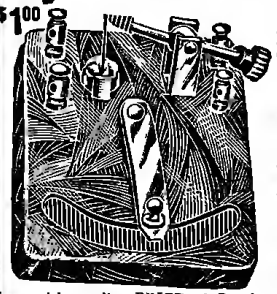
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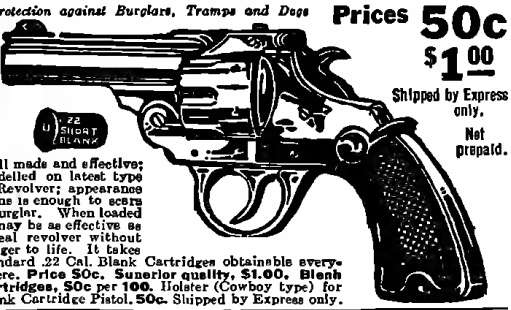
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ANDY'S SHOP MAIL BOX

(Continued from page 16)

Through some error a cut of Cyril Smith's Baby Hydro got onto my composing stone and I ran it last month. I am running it again with my words about Cy.

The other letter that Sam brought over doesn't have an address, but it is from Jack Sanguinetti, who we believe lives at Long Beach, California. Here's a pic of Jack's car and what he has to say about her:

As you see, I'm enclosing a picture of my cycle car. It is powered with a twenty-seven Henderson that I bought for ten bucks and spent about that much in rebuilding it. I'm using twenty by four airplane wheels, that is twenty by four tires on twelve by three wheels. I use cut down buggy springs. I'm using a solid drive now but it is very hard on tires. I intend to build a new car pretty quick, it's to be a front drive with the same engine and wheels. I don't expect to spend over ten bucks on it inasmuch as it is to be made up of Ford T parts. Since I have no welding facilities there will be very little welding involved.

I'm sorry if I've taken up too much of your time but you know how it is when a fellow gets all enthused over something.

Yours truly, Jack Sanguinetti.

P. S. Maybe if a guy knew something about raising metal he could build himself some fenders for his cycle car, eh.

* * *

Pullease, Jack, when you see this pic, or read about it, send us your address. We're going to be snowed under with inquiries. Help a guy out woncha? And if any one reads this who knows Jack, put him wise to the item and tell him to write. All will be forgiven.



Jack Sanguinetti built this highly professional looking midget race car. Here he is putting her through her paces on a west coast beach. A model T furnished parts.

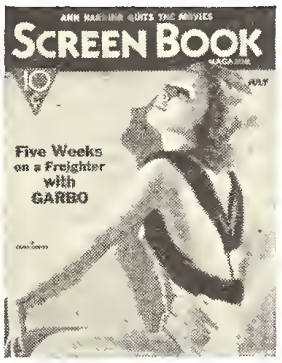








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Do Radio Waves Cause Disasters?

(Continued from page 35)

and lower the day is rapidly approaching when ordinary household objects will fall in tune with sources of energy that will become real hazards to daily life, for while these wavelengths are being made shorter and shorter, the power used is being expanded at high rate.

Let us consider for a moment the startling facts that were discovered by our naval experts in connection with an investigation of the currents set up in large guns on board ship while the radio transmitter was operating. Most of us look upon a voltage of 2000 as a very respectable amount of electricity and we should perhaps be very surprised to be told that voltages of these magnitudes are set up in some of the big guns and that these guns, large as they are, may be exploded by such induced energy.

In ordinary cases, 24-volt electric lights may be lighted on certain of the guns of a battleship when the radio transmitter is working. In such cases, where the gun is mounted close to a powerful radiator of this type, shielding is of little or no use, for even in the case of the larger bores that were breech-protected with turrets, powerful electric currents were found surging back and forth in them.

It should be borne in mind that under such favorable conditions, the guns or other metal objects on shipboard do not need to be in electrical tune or resonance with the source of radiation. The length of guns on board our battleships today are now comparable to quarter wavelengths or multiples of quarter wavelengths of the type of wave generated by naval radio equipment. Such conditions make possible the creation of standing electric waves by excitation from a nearby radiator.

Dangers of Gasoline

But this is but one of the hazards that must be faced. Some idea of the powerful stray currents that may be produced in airplane structures may be had when it is said that the Navy experts found that the primers of airplane wing-tip flares could be set off when the plane was exposed to a high-frequency antennae field. This was not only done but currents *powerful enough to light the airplane running lights* were also produced.

Research of a most convincing kind has demonstrated that resonance between a distant radio transmitter and a gasoline filling hose may reach a point where the current induced in the hose will be great enough to produce a spark and set the gasoline off. From this it is obvious that our radio age and our much vaunted gasoline age are a bit at odds and that with the growing use of shorter waves of the same length as gasoline hose some newly invented precautions will be necessary to protect not only property but human life and limb also.

It is the unexpected results and places in which these strange electric currents are produced that make the hazard very real, very difficult to combat. For instance, it has been found that the copper eaves of a house will have powerful electric currents set up in them under certain condi-

tions, and that these currents are great enough to produce sparks that will set the building afire.

Metal garages, steel walls and roofs, ships' hulls, and steel ceilings, as well as automobiles and railroad equipment become unexpected and unsuspected carriers of death and disaster. So mysterious and incomprehensible are the many and curious manifestations of electric current of this nature that ignorant attempts at prevention may easily do more harm than good.

During the past few years and particularly since we have had commercial aviation, there has been a rather large number of aerial accidents of a rather mysterious nature, accidents which could not be accounted for by mere machine failure or the failure of any vital part of the airplane. Time and time again, experts have examined the earthly remains of a once proud man-bird only to be baffled as to the real cause of the accident. On several occasions airplanes have been seen to merely explode and fall to earth in a streak of flame.

It would, of course, be rather rash to maintain that all of these accidents were due to high-frequency induction, but it seems to be a fairly well established fact that a large number of them have been caused in this way. In some cases it has no doubt been the ship's own radio that sent it plunging to its doom. In other cases, an innocent radio operator perhaps miles away might have pressed his key or closed his antennae switch and sent a half-dozen souls streaking earthward in a furnace of flame.

Protective Measures

The question naturally arises, will future civilization have to make sure that it is out of tune with the high-frequency generators of electricity? With the wavelengths of such equipment getting to a point where even our pocket pencils might be in resonance with them, this is by no means a fantastic question. If these developments go on, and there is certainly no indication of an abatement, we shall simply have to resort to the use of insulating materials. These materials will be used in metal objects in such a manner that they will break the objects up into a distinct number of electric parts. In such a way, present day objects that are now in tune or in resonance with our commercial wavelengths would be thrown out of tune.

If anyone doubts the statements made above, let him witness the experiment whereby such powerful induced currents are permitted to heat a frying pan sitting on cake of ice and to actually fry eggs with heat produced in this strange manner. In such cases, powerful electric currents are set up in the frying pan because the powerful magnetic lines of force are permitted to cut through it. The generated current in the frying is naturally short-circuited and by an effect called hysteresis, heat is produced.

One never knows where these phantom currents are surging back and forth but of their presence engineers have no doubt, and thereby still another complexity, something more to worry about and to guard against, is added to our already complex life.

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BOATS

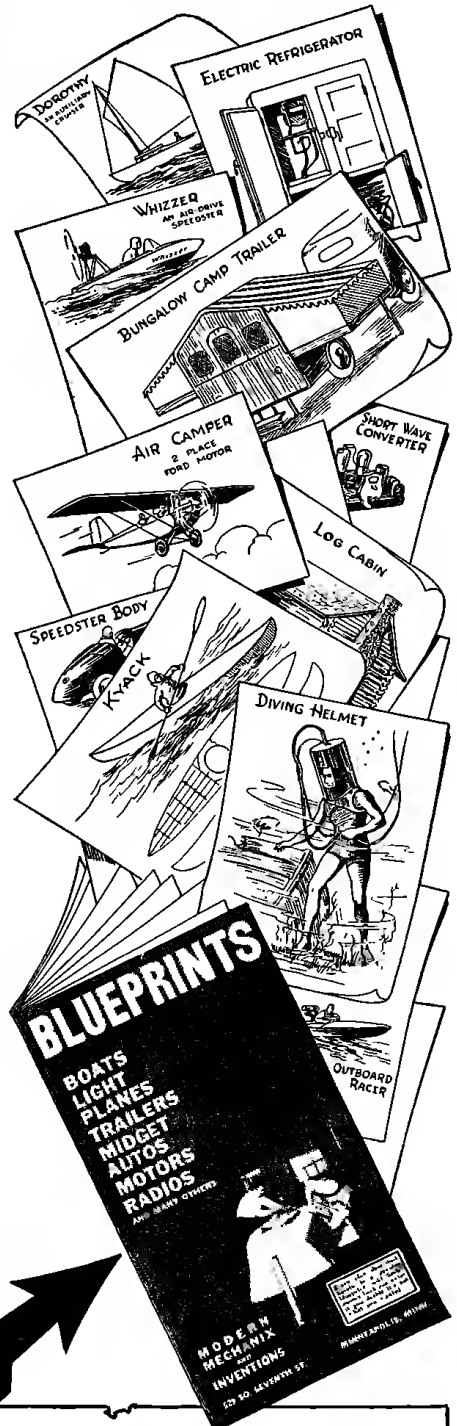
PUNKIN SEED—An 11-foot hydroplane that cleans up in competition with the right outboard on her stern. Capable of 45 m.p.h. Concave V-bottom with one step. Blueprints $1.00

WHIZZER—An air-drive speedster, one step scow type hydroplane, driven by air propeller at rear with motorcycle engine. Motor should be of at least 20 h.p., not over 125 pounds weight. Blueprints $1.00

DOROTHY—A John Hanna design, auxiliary cruiser with 10 h.p. motor, two sail plans. Two berths, five-foot headroom in her 24-foot hull. A deep water boat by a master designer. Blueprints .. $2.50

GANNET—24-foot cruiser with bunks for two, complete galley, nicely boxed-in Ford engine installation. A very popular design by Charles Hall. Total cost, including motor, from $300 to $500, depending on locality. Blueprints $2.00

CANVAS CANOE—By Chester Nedwidek. Length, 16 ft., planking of 5/32 in. cedar covered with No. 8 canvas. $15 should turn out the complete job. Blueprints $1.00



MODERN MECHANIX AND INVENTIONS, 529 S. Seventh Street, Minneapolis, Minn.

Gentlemen: Please send me my copy of the big new Blueprint Book by return mail. This comes to me without the slightest obligation.

I enclose $..... in payment for blueprints of.....

(Note: This form can be used if you wish any of the prints listed above without waiting for the descriptive booklet.)

Name

Address

City State.....

Thousand Ways to Make a Living

(Continued from page 76)

money to help defray vacation costs, but if you live in a rattler-infested country you can utilize the stunt to make "hard times" profits. Pet stores will pay you a good price for rattlers you have captured. They are bought at so much per pound, and are then shipped to snake farms throughout the world. A long stick with a noose on the end, which can be dropped over the snake's head and then pulled tight, makes the best instrument for capturing your prey. Always keep in mind the fact that you are dealing with a deadly creature.

Manufacturing Insoles

Manufacturing and marketing inexpensive insoles which relieve pain in fatigued and aching feet is yielding an enterprising Chicago man an income running $10 to $20 a week. The insoles are cut with scissors from ordinary blotting paper (purchased cheaply in large quantities) into about five different sizes for three styles and distributed through dry goods and shoe dealers, who are allowed a commission on sales. Retail price of your product may be three to six pairs for a quarter, depending upon material costs. You should visit each of your distributors at least once a week to collect your money and leave a new consignment. An ad in a magazine or newspaper, or even a notice in the merchant's daily paper ad, will boost business surprisingly.

Hooked Rugs Are Money-makers

A Fort Wayne, Indiana, man, thrown out of work and with a family to support, found he could make a modest living manufacturing quilt patches and hooked rugs. From a local undergarment manufacturer he purchases scraps of knit silk underwear for junk rag pieces. These scraps are then cut into strips and made, by the feminine members of the family, into hooked rugs. Some are dyed for artistic effects, others left natural. Exceptionally beautiful, the product commands a good price from well-to-do people seeking unique home furnishings. As a sideline, this ingenious man buys scraps of print material from garment makers, sorts them into color schemes, and puts them into bundles wrapped in cellophane. These he sells to local stores for quilt patches.

Shoe Repair Service

Fifteen to twenty-four dollars a day was the income taken in by an enterprising young man in an eastern city when he succeeded in selling his shoe repairing scheme to local laundry companies. His scheme was to get these companies to allow their drivers to pick up shoe repairs along with their laundry and return the repaired shoes with the laundry. He first interested several of the best shoe repairers in the city, and obtained a special discount of 40 to 50 per cent on large quantities of shoes brought to their shop. With the laundry companies he drew up a contract allowing them 20 per cent of the collections, and an additional 10 per cent to the drivers, leaving him 10 to 20 per cent of the proceeds. For their share, the laundry advertised the new service, which worked up a thriving trade.

HAENEL "100 SHOT" REPEATER

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Latest Model 1933 Haenel repeating pistol. Sturdy, massive construction, easy cocking lever, 100 shot magazine. Accurate for target. Powerful for small game. Blue or Nickel finish, shoots B. B. steel shot. Weight 18 oz. Price with 500 shots Free - $4.95—$2.00 deposit on C.O.D. *Free Catalog—Colts, S.&W. Rifles, Binoculars, etc.*

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New Adding Machine
Fits Vest Pocket!

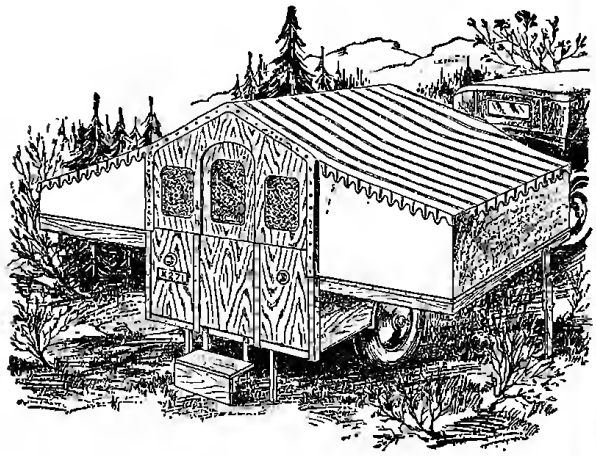
Adds, subtracts, multiplies, and divides like $300 machine—yet it costs only $2.50. Weighs only 4 ounces. Not a toy—guaranteed for lifetime. Perfectly accurate. Lightning fast. Sells on sight to business men, storekeepers, homes—all who use figures. Write at once for Free Sample Offer and Money-Making Plan. 100% Profit!

AGENTS



C. M. CLEARY, Dept. 960, 303 W. Monroe St., Chicago

Build This GYPSY Trailer *for* Vacation Time!



This Bungalow on Wheels

—sleeps four adults
—costs $30 or less to build
—folds up to car width when on the road
—carries all household equipment, including running water and built-in beds.
—is completely weatherproof

NO WONDER this trailer has proved to be the most phenomenally popular how-to-build project in years! Literally hundreds of them have been built since the plans originally appeared in the May, 1932, issue of Modern Mechanix and Inventions. The illustration above shows the outfit in camp for the night, unfolded as a house. For traveling, the side balconies are folded inward, the roof top down, and presto! you have an easily towed trailer which allows complete vision from the rear window of your car.

BLUEPRINTS show the trailer layout with all dimensions. Prints are large size, specially made for shop use, easy to read. Any man who can tell a hammer from a saw can put this trailer together to last for years. Price of blueprints, postpaid **$1.00**

Modern Mechanix and Inventions
529 S. Seventh St. Minneapolis, Minn.

Gold Recovered From Old Jewelry

(Continued from page 77)

and a standard gold needle set. The article is first rubbed on the stone, making a mark thereon. If it is offered or marked as 18K. gold, then another mark is made on the stone with the standard needle marked 18K.

Now a few drops of the testing acid is poured on the stone to cover both marks which have been made. If the article is composed of 18K. gold, the mark made by it will last the same length of time as the mark made with testing needle. If not 18K. gold, the mark made by article will fade and disappear while the mark made by testing needle will remain.

The testing acid is made as follows:

For 6-12K. gold—20% c.p. nitric acid, 30% salt, 50% distilled water.

For 12-18K. gold—50% c.p. nitric acid, 20% salt, 30% distilled water.

For 18-24K. gold—95% c.p. nitric acid, 5% salt.

The articles to be tested, which are usually termed "scrap," are sorted into two grades; all over 14K. in one pile, and all under 14K. in another pile. Gold filled articles, while not very profitable to handle, will be accumulated and are set aside to be reclaimed by an acid stripping process.

The following method is used to recover the gold from all articles over 14K. The scrap is mixed with an equal amount (by weight) of flux composed of one part borax to one part sal-ammoniac. The crucible is charged with a portion of the mixed scrap and flux and then placed in the oven and melted to liquid consistency, after which it is granulated by pouring the liquid into a tub of cold water from a height of about three feet.

The scrap in granular form is placed in an evaporating dish, covered with aqua-regia (a mixture of two parts c.p. hydrochloric acid to one part c.p. nitric acid) and set over a hot sand bath. This will cause an effervescent reaction.

When the reaction stops, dilute the mixture with an equal amount of distilled water and filter through filter paper into a clean glass. Then pour into the liquid a saturated solution of warm ferrous-sulphate, which will precipitate the gold to the bottom of the glass. Add the ferrous-sulphate until no more gold is precipitated.

Let this stand overnight in a warm place, then syphon off the liquid, wash the residue in hot water and then digest it in the evaporator over the sand bath with a mixture of one part hydrochloric acid to one part water. Rinse residue in cold water and dry over the sand bath.

The gold is now in the form of brown powder. Pack the powder in a bone-ash cupel, one part gold to one part flux. Place in the oven and when the gold is melted into a round button, throw on a pinch of sodium nitrate to clear it of any remaining impurities. The button should now be a bright yellow in color.

Let cool in cupel until it is a dull red, then plunge cupel containing button into a saturated solution of salt water. Button should be concave on under side after cool. This is now 24K. fine gold. After several or more buttons are accumulated, they are remelted, poured into bars and shipped to the U. S. mint.

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Dear Mr. Yates: Please send me this new Triple-Protection Plan for Inventions and tell me how I can get my invention SAFELY in the hands of manufacturers within a month and at 1/10th to 1/20th the usual cost. I am enclosing $1.00.

(Please PRINT your name and address)

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Gold Recovered From Old Jewelry

The articles under 14K. are first reduced to 6K. by the addition of silver. To find the amount of silver necessary to reduce to 6K., multiply the weight in D.W.T. by the difference of the fineness on hand and the fineness required, and divide by the latter. The result will be the weight of silver to be added to the scrap.

Melt the mass (using same amount of same flux as before), then granulate, as before. Place in evaporating dish, cover with one part c.p. nitric acid to one part distilled water and set on sand bath. As that acid evaporates, freshen two or three times with new acid.

When all reaction stops, wash first in hot, then cold water. Then place in evaporator again and cover with a solution of one part water and nine parts c.p. sulphuric acid. Heat again over the sand bath and when all reaction stops, wash again in hot, then cold water. Melt the residue into a button as above and this results in fine gold.

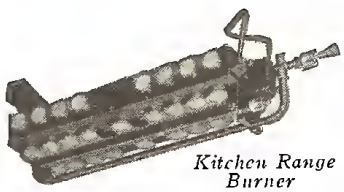
The furnace or oven shown in the photographs is built up of brick, coated inside and out with fire-clay, and lined inside with Hytempite Refractory furnace lining. This may be obtained from any large assayer or chemical supply house; likewise all other acids and equipment shown in photographs. The furnace is heated with an ordinary blow-torch.

In buying the old gold you will be guided by the following formula. Multiply the penny weight (D. W. T.) by the carat quality by four cents, which will give you the actual convertible cash value of the article before refining.

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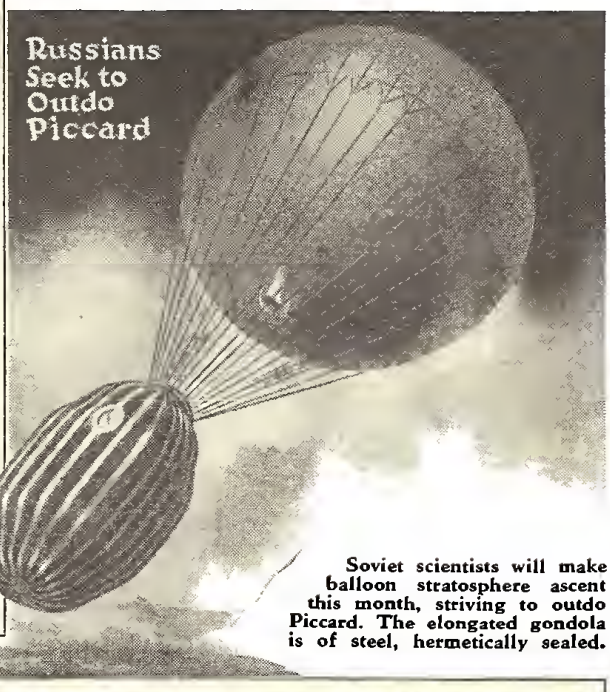
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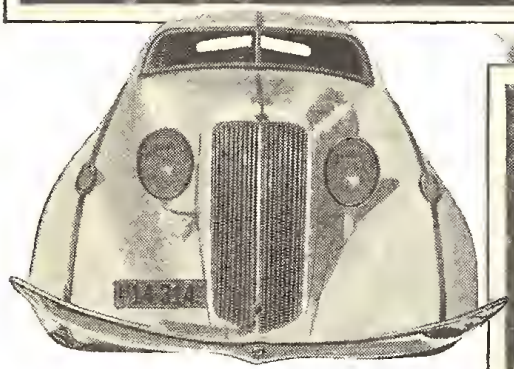
MODERN MECHANIX
EDITORIAL OFFICES, 529 SOUTH SEVENTH STREET

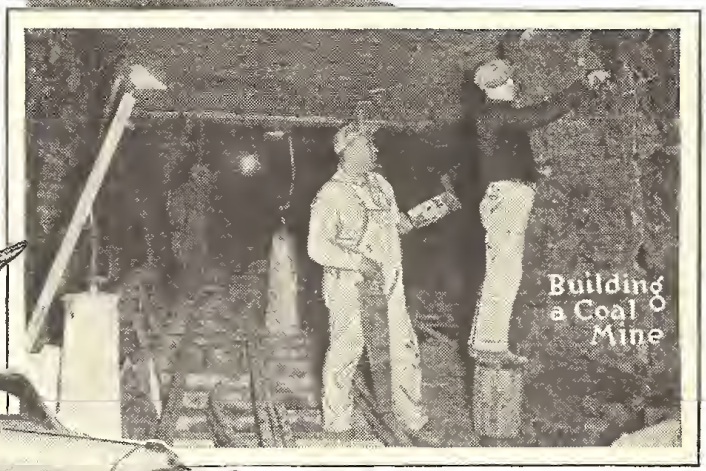
Science News Notes



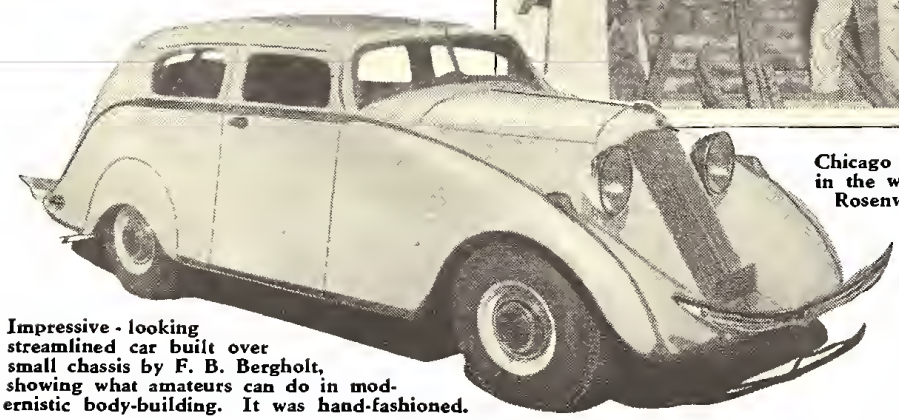


Soviet scientists will make balloon stratosphere ascent this month, striving to outdo Piccard. The elongated gondola is of steel, hermetically sealed.





Chicago has the only indoor coal mine in the world. Its arrangement in the Rosenwald Museum was described in these pages some weeks ago. Construction has now advanced far enough to picture the results. Workmen are shown above putting a "veneer" of coal in place, just as nature built the vein in an Illinois mine.

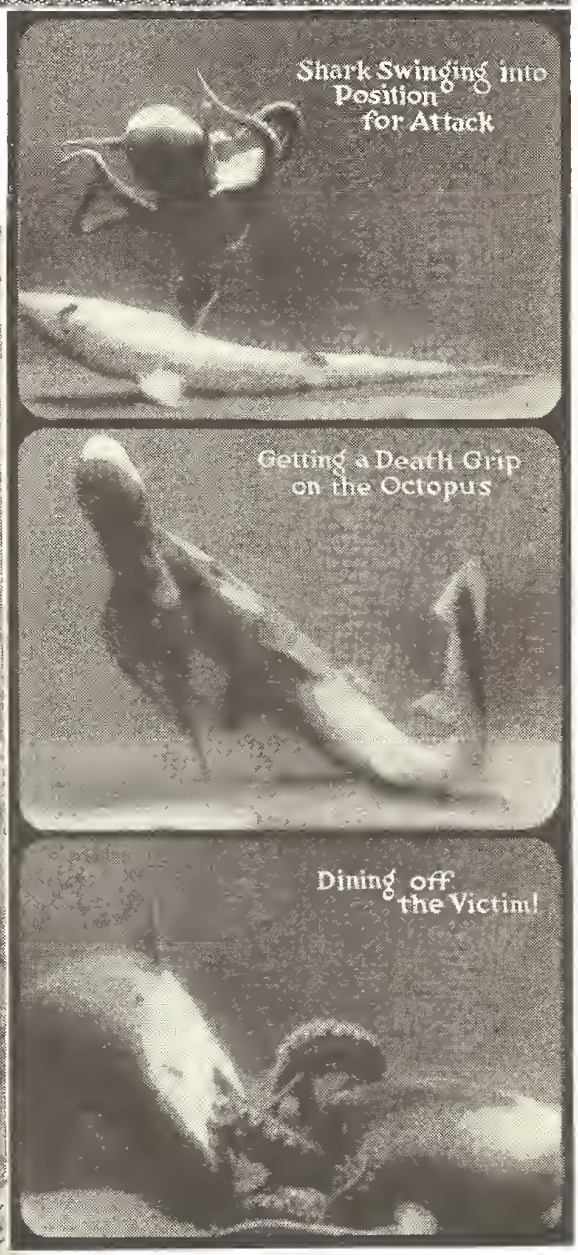


Impressive-looking streamlined car built over small chassis by F. B. Bergholt, showing what amateurs can do in modernistic body-building. It was hand-fashioned.

AND INVENTIONS
MINNEAPOLIS, MINNESOTA — PRICE 15 CENTS

of the MONTH

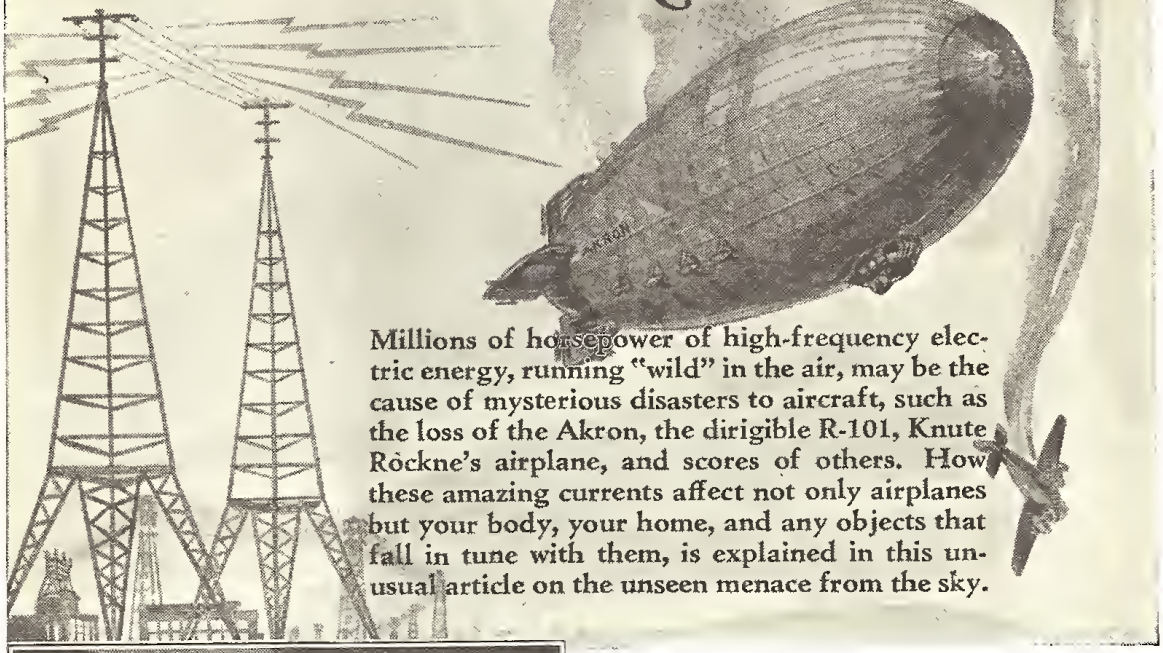




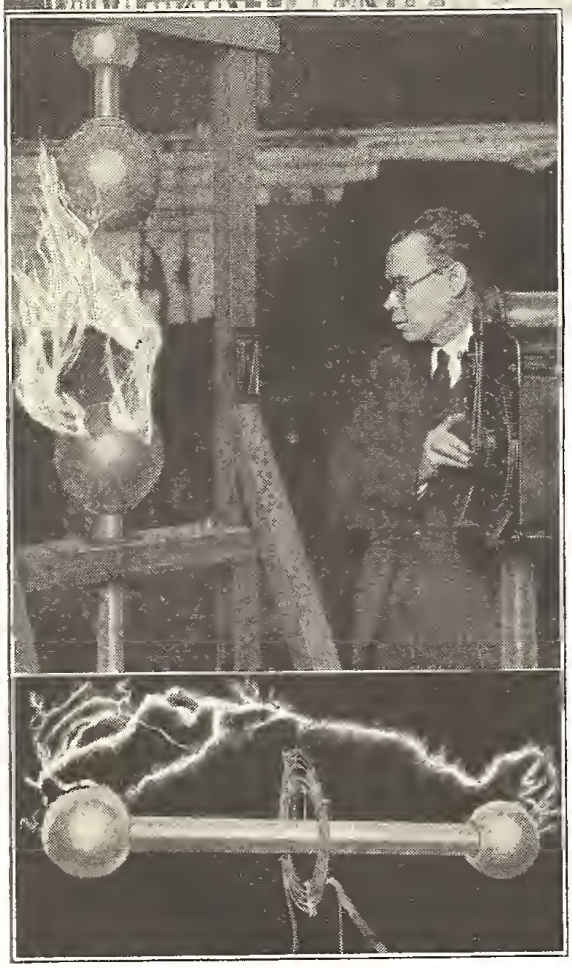
Shark-Octopus Undersea Battle Filmed

A most remarkable battle between a shark and an octopus has been photographed by a daring cameraman for the film, "Samarang"—(Out of the Deep). With his camera and equipment inside a diving bell, open at the bottom, the internal air pressure being sufficient to keep the water out at shallow depths, he placed a piece of meat in the water to attract the shark, the octopus already being in the vicinity. The battle which ensued between shark and octopus lasted twenty minutes, but it was quite one-sided. The shark swung into attack from below, as shown in one of the pictures, getting a death grip which is never relinquished until the helpless victim succumbs. The shark was of the tiger variety. The battle was staged in comparatively shallow water to allow of sufficient light for recording the extraordinary scenes. The battle winds up with the shark dining off one of the tentacles of his foe.

Do WILD Radio Waves



Millions of horsepower of high-frequency electric energy, running "wild" in the air, may be the cause of mysterious disasters to aircraft, such as the loss of the Akron, the dirigible R-101, Knute Rockne's airplane, and scores of others. How these amazing currents affect not only airplanes but your body, your home, and any objects that fall in tune with them, is explained in this unusual article on the unseen menace from the sky.



Destructiveness of high potential currents is demonstrated in these Tesla coils. Tremendous voltages are built up by induced current until they break loose and jump the gap.

by BURTON MANFRED

THE radio experts of the United States Navy have recently completed a series of astounding experiments, experiments that prove far beyond the shadow of human error that there is a new menace in the sky. Hour after hour, day after day countless thousands of horsepower of high-frequency electric energy is being pumped into the air by great radio stations and other high-frequency machinery which has become a part of our civilization.

Only an infinitesimal speck of this prodigious output of energy is consumed by the radio receivers of the world. What happens to the rest? Does it become a wild and roving source of death and destruction or does it rush into the frigid voids of space never to return to the earth?

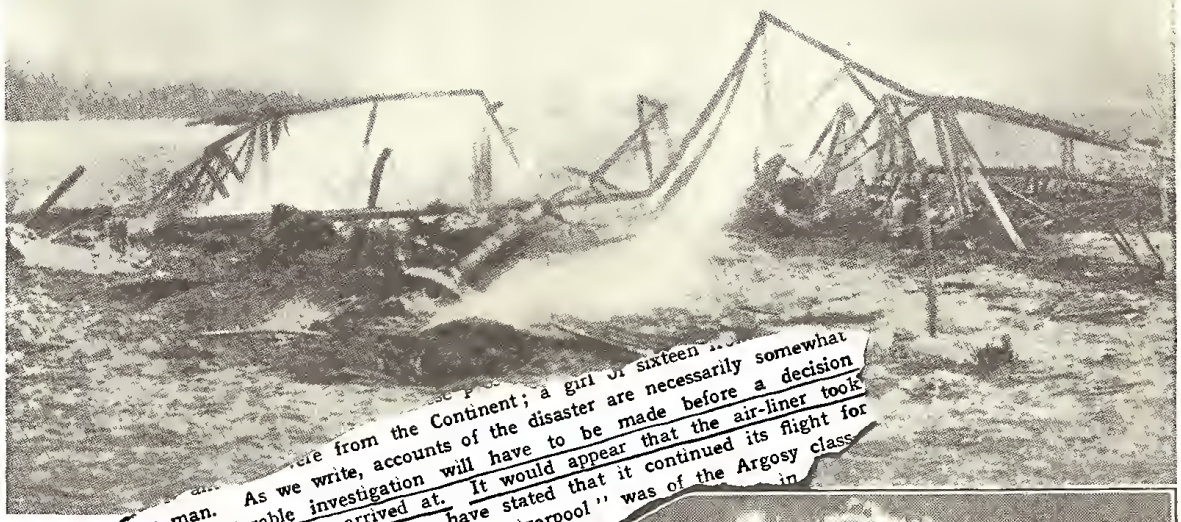
What Happens to Wild Energy?

Engineers have found that it does both, great quantities of it being absorbed by living and inanimate objects and in these objects it is detectable as surging forces of electric current. Even the man-in-the-street absorbs a part of this energy and the tissues of his body are seats of tiny electric currents in tune with the powerful broadcast transmitters of the land.

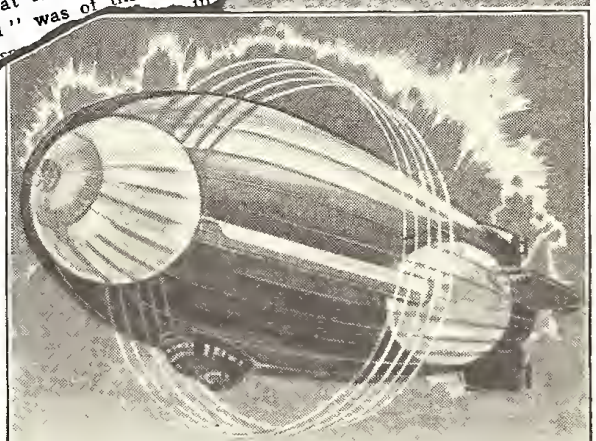
It is only when these wild waves reach large metal structures, however, that danger develops. In such structures electric currents often reaching a potential of several thousands of volts are generated and sparks or discharges may be produced that will cause fire or explosion.

These new discoveries of radio engineers naturally bring up the subject of the mysterious airplane and sea accidents that have

Cause AIR DISASTERS?

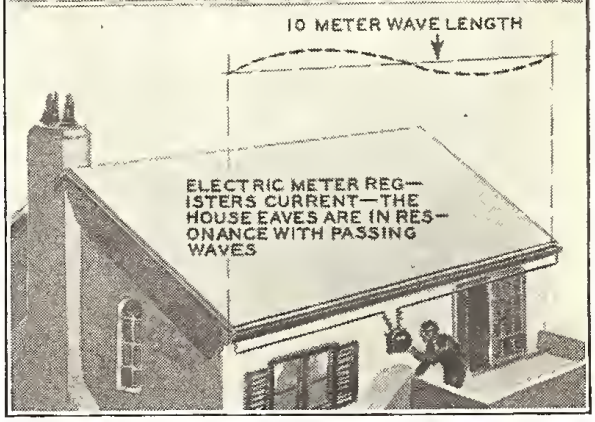


...from the Continent; a girl of sixteen ...
...and a Belgian man. As we write, accounts of the disaster are necessarily somewhat confused, and considerable investigation will have to be made before a decision as to the cause of it can be arrived at. It would appear that the air-liner took fire while in the air, and eye-witnesses have stated that it continued its flight for over a mile before it crashed. The "City of Liverpool" was of the Argosy class ... twenty-two-seater ... biplane, with a ... in



DIAGRAMMATIC VIEW SHOWING HOW "WILD" HIGH-FREQUENCY CURRENTS MAY HAVE CAUSED MYSTERY AIR DISASTERS—SUCH AS DESTRUCTION OF AKRON, R-101, KNUTE ROCKNE PLANE, AND OTHERS.





Copper house eaves, in resonance with passing waves, can set up sparks that will set the building afire. Short radio wavelengths are "in tune" with many common objects.

Recent example of an airplane crash whose cause remains an official mystery, as indicated by newspaper account, is that of the "City of Liverpool," crack multi-engined plane on London-Continental service. Note that it "apparently took fire in the air"—a circumstance which may well have been caused by wild radio waves through high-frequency induction. In the column at right, the phantom view of a Tesla coil, superimposed over the dirigible, indicates how high potentials can be built up in metal framework of such ships as the Akron until a point of destruction is reached.

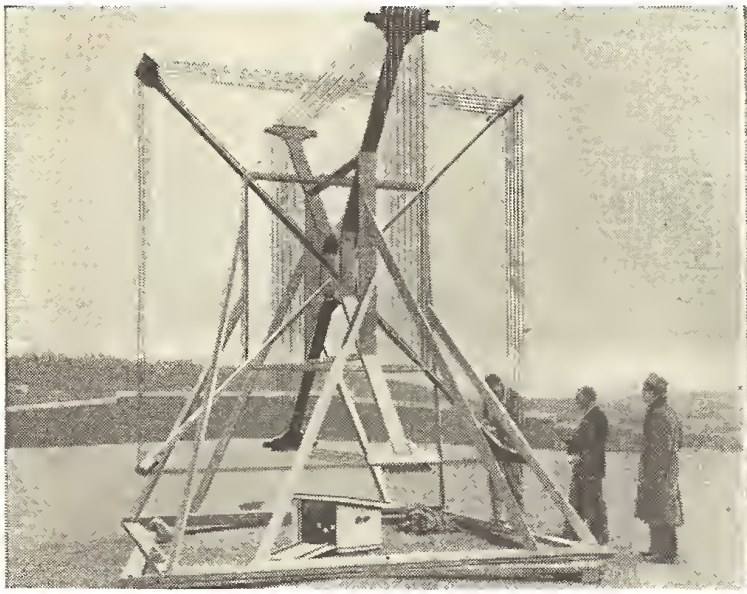
gone unsolved during the past few years. What of the Naval collier *Cyclops* that was swallowed up by the sea? Was it a victim of its own radio transmitter and did these powerful fugitive currents cause an explosion on board that obliterated it from the face of the world?

Mysterious Airplane Accidents

We have the same right to put the same question in connection with a number of very mysterious airplane accidents that have occurred during the past few years, notably the one in which the famous and lamented coach, Knute Rockne, was killed. The airplane is particularly susceptible because of the inevitable gasoline tank. Sparks by induced current at this point will be bound to produce fatal results if the ship is afloat.

It has long since been known also that large steel buildings in the vicinity of broadcasting stations suck in tremendous quantities of this energy and that they become veritable electric dynamos. So potent does this radiation become that small electric lights may be lit by wireless under the antennae systems of large radio stations.

Most recent of those which come to mind is the disaster of the dirigible *Akron*, the precise cause of whose collapse into the At-



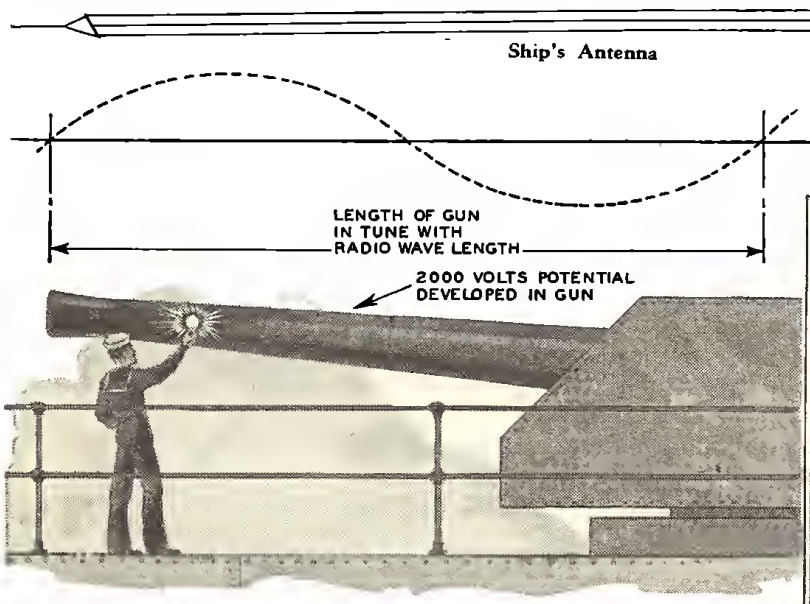


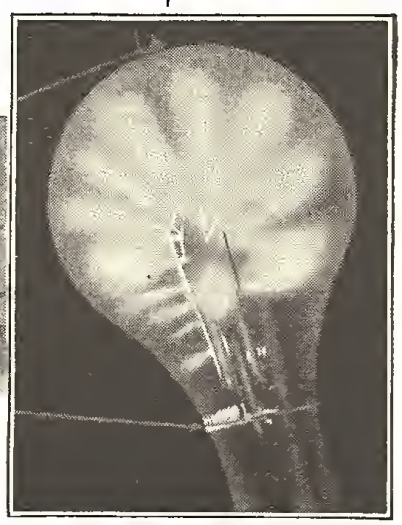
Left above, novel radio antenna for broadcasting direction signals to airplanes. This is but one of hundreds of agencies which pour wild high-frequency electric energy into the air. Right above, measuring electromagnetic field of radio transmitter a few blocks away. It is close enough to set up powerful high-frequency currents in the framework of surrounding skyscrapers. Potentials of several thousand volts are often found.

lantic is unknown at this writing. The British dirigible *R-101,* which fell in flames in France, still presents a mystery as to the cause of its destruction, since the ship was very carefully fireproofed and supposedly immune to this form of destruction. The series of such catastrophes could be endlessly augmented by a listing of airplane disasters in which the planes apparently took fire in the air from unknown causes.

The natural tendency has been to put the blame on gasoline, accidentally ignited—this in spite of the fact that every precaution known to science is taken to prevent just such catastrophes. The appalling number of these accidents which have had to be written down as mysteries demands that serious credence be given the experiments which indicate that tremendous electrical forces unleashed in the sky through radio stations and other mediums are agencies of destruction.

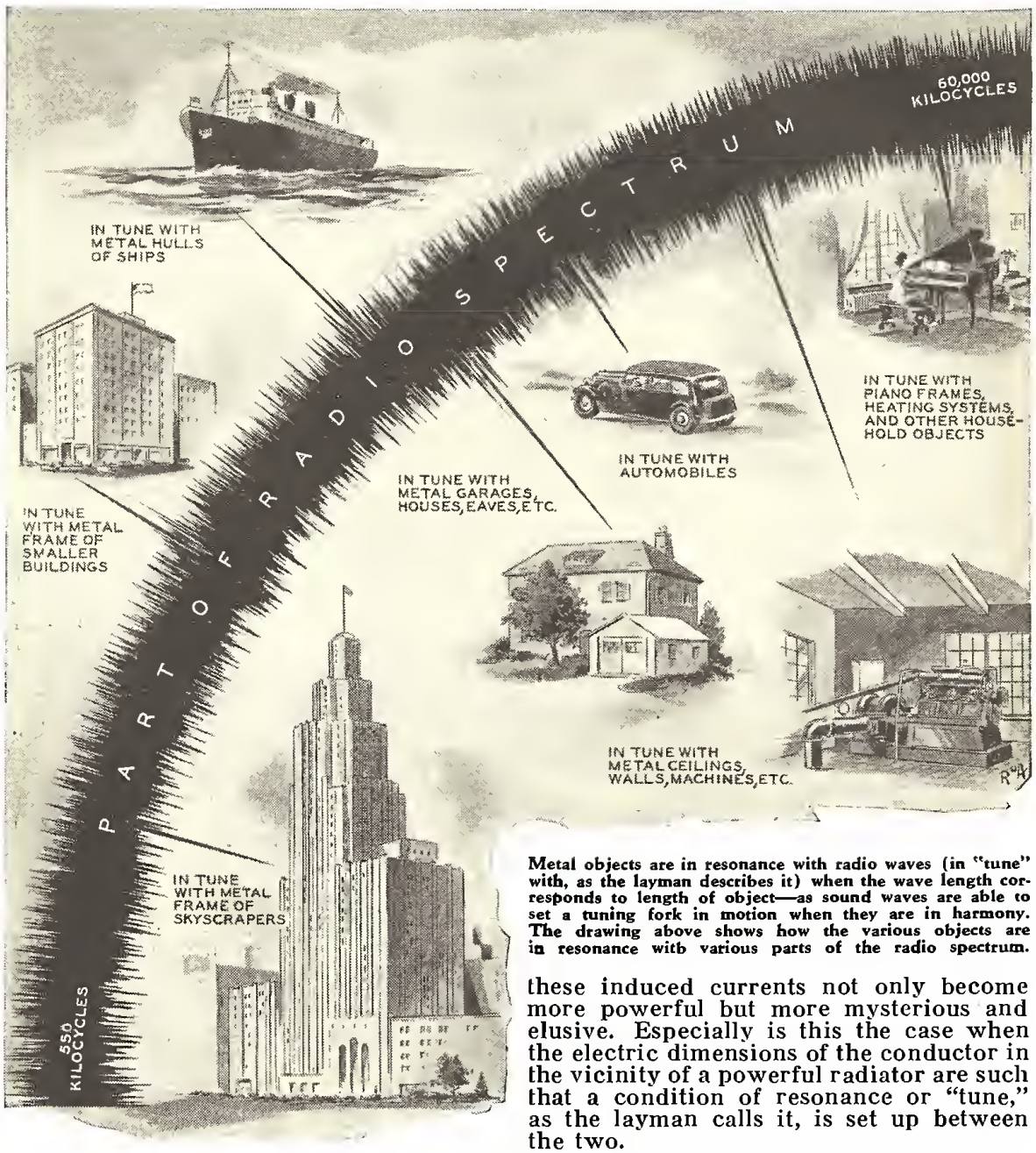
On this month's cover of MODERN MECHANIX AND INVENTIONS the artist has illus-





Naval experiments prove that a lamp bulb can be lighted by holding it on certain guns of a battleship when the boat's radio transmitter is operating. Voltages as high as 2000 are set up. At right, nitrogen filled bulb glowing when suspended, without direct contact, near source of high-frequency energy.

How Metal Objects in Everyday Use Fall in Resonance With Radio Waves



Metal objects are in resonance with radio waves (in "tune" with, as the layman describes it) when the wave length corresponds to length of object—as sound waves are able to set a tuning fork in motion when they are in harmony. The drawing above shows how the various objects are in resonance with various parts of the radio spectrum.

trated the principle by which a dirigible could be destroyed by wild electric currents. He has superimposed over the body of the dirigible a Tesla coil of the type used in generating artificial lightning discharges, to portray graphically the tremendous electrical forces which roam the skies.

Those who understand electricity at all know that when a metal conductor is brought into proximity of a wire carrying alternating current, a second current will be set up in that conductor. This is called electromagnetic induction and at the higher frequencies such as those used by the newer electric furnaces and the radio stations, to say nothing of X-ray tubes and some of the new therapeutic equipment in hospitals, these induced currents not only become more powerful but more mysterious and elusive. Especially is this the case when the electric dimensions of the conductor in the vicinity of a powerful radiator are such that a condition of resonance or "tune," as the layman calls it, is set up between the two.

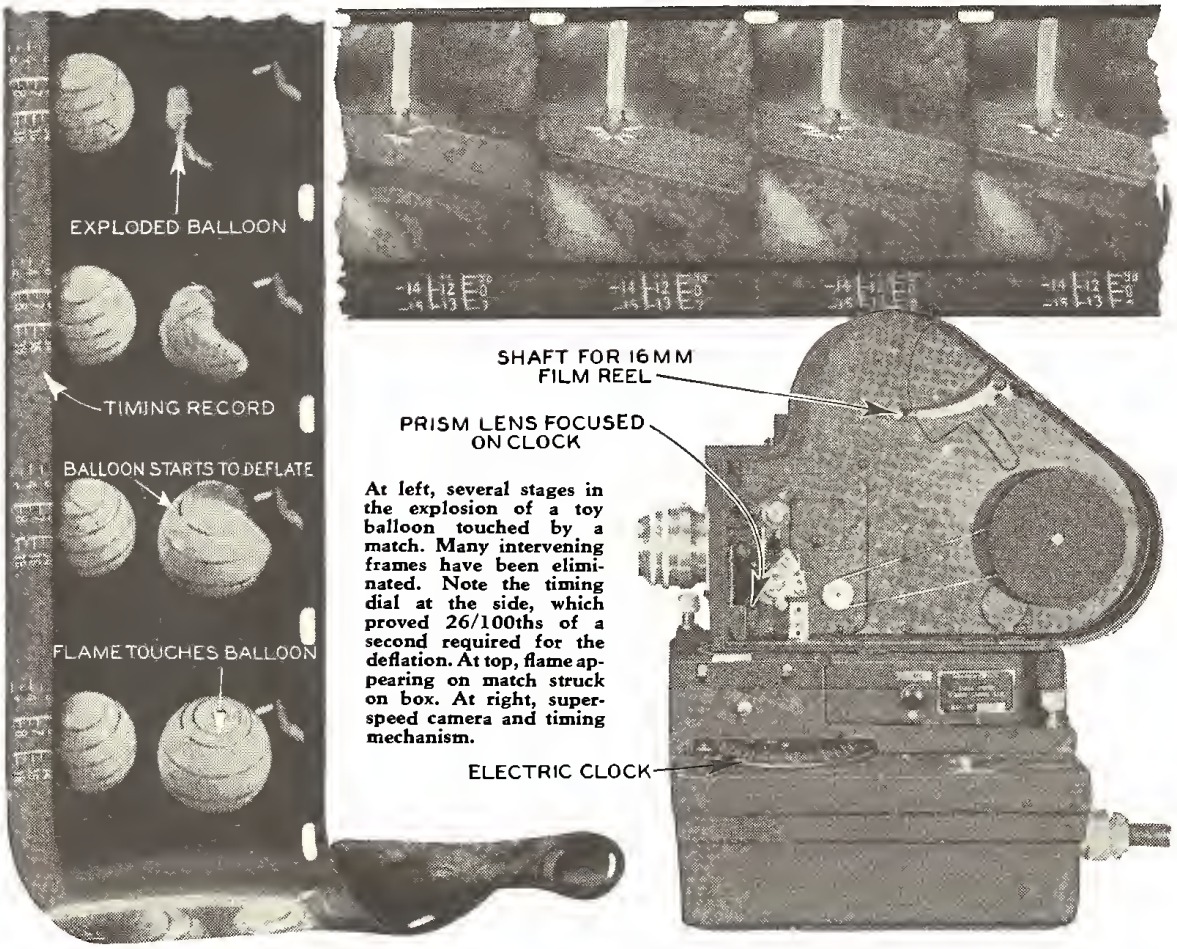
Long Wavelengths Not So Dangerous

In the old days of radio when large wavelengths were used, wavelengths so great that there was nothing on earth in the way of man-made metal objects to fall in tune with them, there was little danger from this source, but today the wavelengths have been pushed down into a region of smallness where they compare to the ordinary things and appliances that we use every day.

A five-meter wave just about "fits" our car and wavelengths a little above this are accommodated by the metal frames of the average airplane. With the tendency of radio engineers to push wavelengths lower

(Continued on page 24)

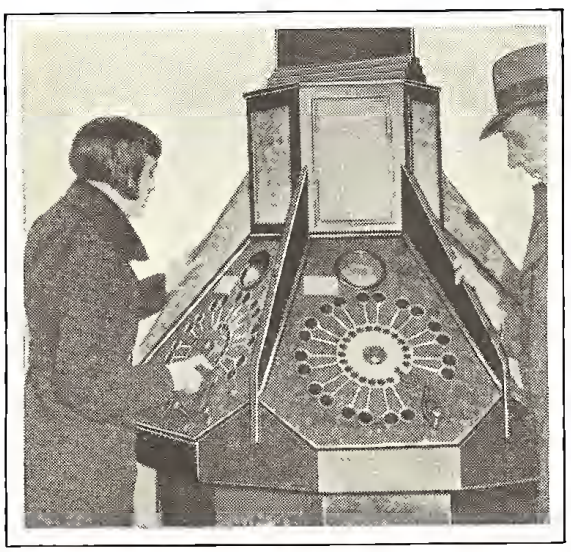
Super-Speed Movie Camera "Stops" Exploding Balloon



At left, several stages in the explosion of a toy balloon touched by a match. Many intervening frames have been eliminated. Note the timing dial at the side, which proved 26/100ths of a second required for the deflation. At top, flame appearing on match struck on box. At right, super-speed camera and timing mechanism.

Information at Turn of Dial

WORKING on the telephone dialing principle, London subways have installed a machine which gives passengers the location of a particular place, amount of fare, and platform from which train starts—all at a mere turn of the dial.



Automatic information booth at Charing Cross Station.

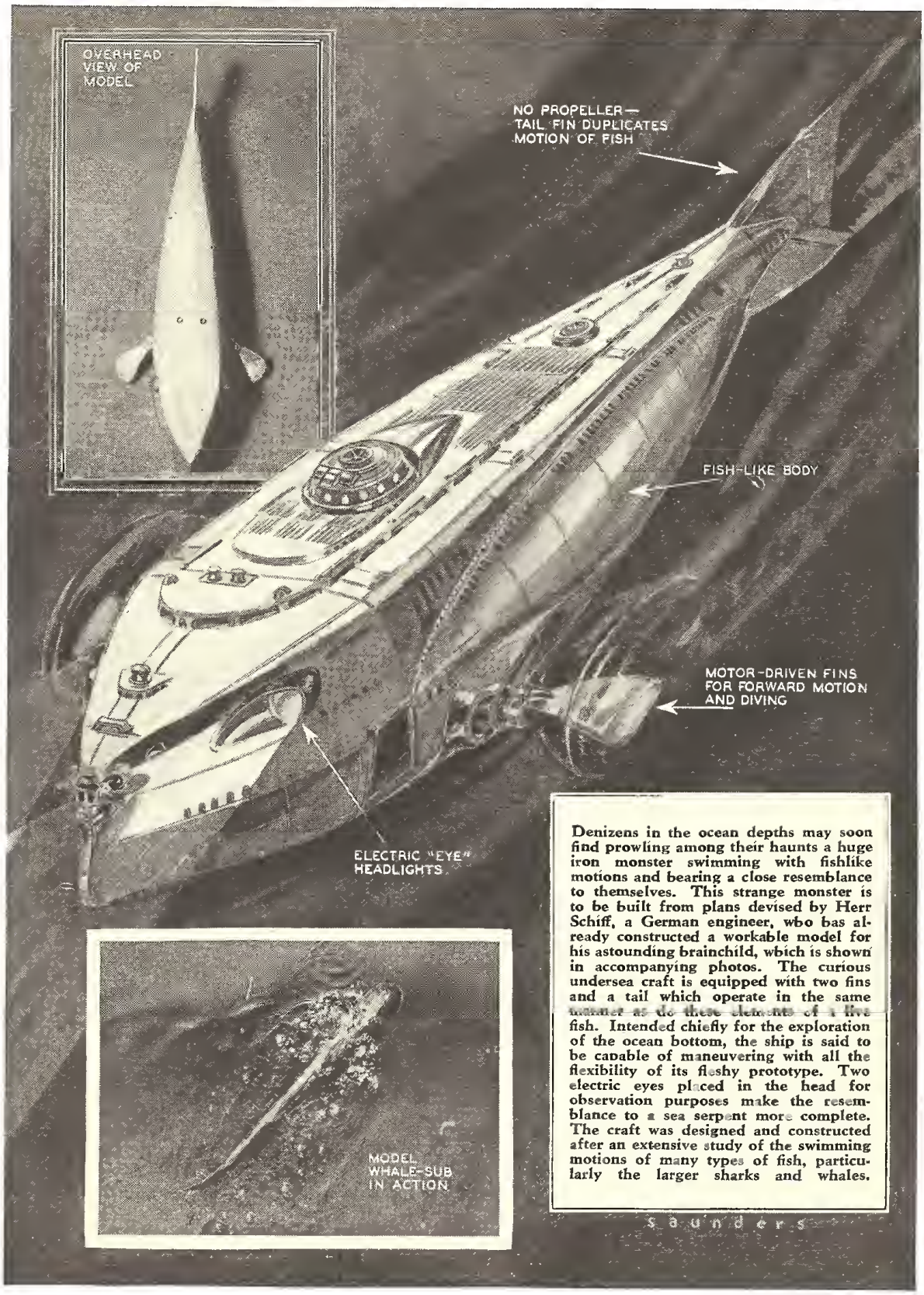
AMAZING slow-motion movies which show the successive stages of deflation of a toy balloon exploded by touching a match to it, photographed at the incredible speed of 2,000 frames *per second,* are produced with ease by a new high speed camera and electric timer which is by far the fastest thing of its kind ever developed.

Examples of the type of pictures produced are presented above. Note that approximately one-fifth of each picture "frame" is occupied by the timing dial which is a unique feature of the camera. Electrically driven, it gives a positive measurement of time intervals, in units of a thousandth of a second. Ordinary 16 mm. film, the same width as that used on amateur movie cameras, is employed in the super-speed machine.

Pictures taken with the camera prove how erroneous are some of our conceptions. Most of us, recalling the sudden "pop!" with which a toy balloon vanishes when a match is touched to it, consider the process practically instantaneous. But this camera proves that it takes 26 hundredths of a second for the hole to burn in the rubber of the balloon. And when you wink an eye it takes 11 hundredths of a second.

It is expected that the mechanism will find industrial use in analyzing the operation of fast-moving machinery.

Iron Whale Swims Ocean Bottom Like Fish



Denizens in the ocean depths may soon find prowling among their haunts a huge iron monster swimming with fishlike motions and bearing a close resemblance to themselves. This strange monster is to be built from plans devised by Herr Schiff, a German engineer, who has already constructed a workable model for his astounding brainchild, which is shown in accompanying photos. The curious undersea craft is equipped with two fins and a tail which operate in the same manner as do these elements of a live fish. Intended chiefly for the exploration of the ocean bottom, the ship is said to be capable of maneuvering with all the flexibility of its fleshy prototype. Two electric eyes placed in the head for observation purposes make the resemblance to a sea serpent more complete. The craft was designed and constructed after an extensive study of the swimming motions of many types of fish, particularly the larger sharks and whales.

At top is seen model of the iron whale ready for a test trip. Note the fish-like fins and the two electric eyes set in the head section of the body. At bottom may be seen the model preparing to submerge to prove the practicability of the plans.

What SCIENCE Says About

NOW that 3.2% beer has been on national sale for a few weeks, it might be thought that the question of its intoxicating effect would have been settled once and for all by actual experiment—but oddly enough the country is still divided into different camps, one of which maintains that the new beer is decidedly intoxicating, and the other that it is as harmless as soda pop.

In a legal sense 3.2 beer is not intoxicating, by Congressional fiat. The Dry camp maintains that Congress passed the bill with its tongue in its cheek, pointing out that 3.2% alcohol packs a deadly wallop, sufficient for a glass of beer to have dire effects on the human frame. Beer consumers laugh at this stand as preposterous.

How Much Alcohol Intoxicates?

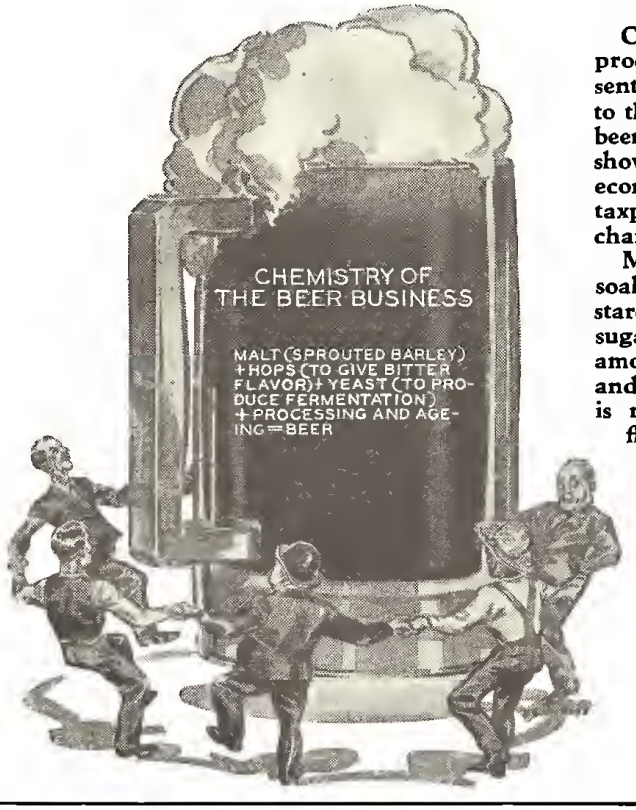
It remains for medical science to come to the fore with the answer to the whole question, reducing it to a simple mathematical formula whose details are given in the drawing at the right. Intoxication requires that a quantity of alcohol equal to two-tenths of one per cent of the amount of blood in the body be introduced, and it is thus a simple problem in arithmetic to determine when a state of inebriation will be reached.

Rate of consumption of alcohol also affects its intoxicating qualities, since the system burns up alcohol at the rate of a sixth of an ounce per hour. If you drink five quarts of beer it is equivalent to 6 1/5 ounces of alcohol, which would require 39½ hours for the system to dispose of. The likelihood is that the beer you drink is less than 3.2% alcohol, since tests indicate that brewers skimp on the side of safety to avoid coming in conflict with the law.

Economic Reactions

Since 3.2 beer was given to the country mainly for economic reasons, it is interesting to note that practically all breweries are operating on a 24-hour basis and price increases are looked for with the threatened exhaustion of the hop crop. The brewing of beer is a fascinating example of chemistry, as explained below, but it is much more than that—a far-flung industry whose ramifications affect many other businesses.

Milk, coffee, candy sales report decreases following beer's return; bottle-makers, label printers, coopers, and equipment manufacturers report excellent business. No great aid to the farmer is expected from beer manufacture, since the quantities of wheat, oats and corn used in the production of alcoholic drink is insignificant. Barley is the main farm product used in beer, being the basis of malt.



One of the most fascinating of all chemical processes is that which produces beer. Its essentials are rather simple, reducing themselves to the handy formula lettered on the glass of beer at the left, around which the artist has shown an elated company which hope their economic burdens will be lessened by beer—taxpayer, brewer, farmer, bottle-maker, merchant.

Malt is made from barley which has been soaked, sprouted, and kiln dried, and the starch of its grains is converted into malt sugar when mixed in mash tuns with an amount of pre-cooked grain, principally rice and corn. The product is wort. The malt is rather sweetish; the characteristic bitter flavor of beer is imparted by hops, added to the liquid wort boiling in a brew kettle. Yeast is then added in fermenting vats, and the product foams away for some ten days while the sugar is converted into alcohol.

Most differences in taste of beer come from varying proportions of malt and hops. The more hops, the bitterer; the more malt, the sweeter. The type of water used also greatly affects the beer taste. Identical formulas produce different tastes when different water supplies are used.

3.2 BEER INTOXICATION



Here's what medical science says about the intoxicating qualities of beer of 3.2% alcoholic content. Doctors have never been, and are not now, in agreement as to the beneficial or harmful effects of beer, one group classifying it as a food for its protein content and a valuable means of getting needed water into the system, the other classifying it as a drug temporarily exhilarating but with a depressive after effect. Both camps agree that harm comes only from excessive use.

I Learned About LIONS by



This contraption, on which lions can sun themselves, was built by Mr. Gay after observing that in his native Africa the lion has a habit of lying in the sun atop a termite mound.

IN SURROUNDINGS totally unlike those to which their jungle relatives are accustomed, my 219 African lions—ranging in age from a few days to 17 years—are bred, reared, and in some cases trained for particular public exhibit.

The most brilliant lion, I have learned during a decade spent in this queer business, displays less intelligence than the commonest dog. Lions face a wire barrier and accept their captivity without question, seeking neither to climb up nor to burrow under toward freedom. Dogs, on the other hand, will make strenuous efforts to escape from imprisonment.

Yet no animal receives greater public adulation than lions. Their great, tawny heads shake; they emit ear-splitting roars; they apparently fight with trainers. Behind their usually calm eyes lurks great, and sometimes immediate, danger. They are ferocious beasts.

Oddly, those born and bred in captivity present greater threats to trainers than do jungle-born lions. Why? Because the jungle-bred lion, not having known humans in youth, fears and respects his master when at last they are brought in contact.



Two lion cubs, four months old, observing visitors: They look innocent now—but wait until they're four years old!

On the other hand, captive-born lions usually are petted during babyhood. Everyone knows that familiarity breeds contempt. Nowhere is this more true than in our relationship with these magnificent beasts.

Behind the danger that is constantly present stands this one fact: the lion, no matter where, when and how born, is a wild animal. He always will be wild. He

"GROWING" Them

by **CHARLES GAY**
of the Gay Lion Farms

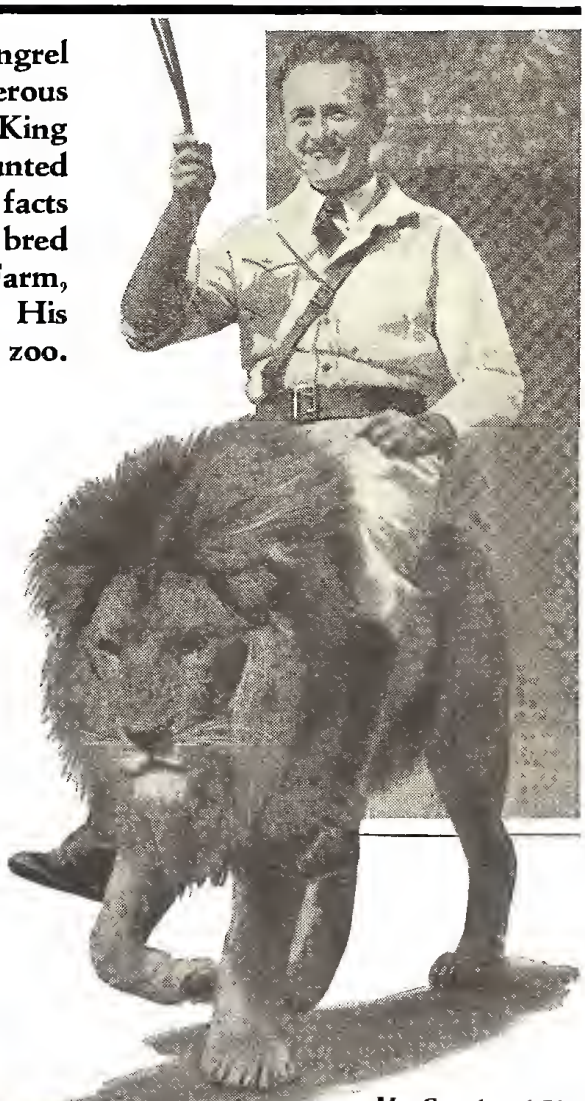
A lion has less intelligence than a mongrel dog. Captive-bred lions are more dangerous than their jungle-born brothers. The King of Beasts' disposition is never to be counted on. These are some of the disillusioning facts which Mr. Gay, who for nine years has bred captive animals in his famous Gay Lion Farm, has learned about Mr. and Mrs. Leo. His article is as thrilling as a visit to the zoo.

passes from babyhood at three years to the full-grown lion stage. After that, look out!

I have heard many people say that roaring lions in a circus performance are merely showing off when they snarl and snap at their trainer. In a measure, this is true. Yet if you will examine the history of lion trainers, you will find that the best of them frequently look up at a hospital ceiling, lying in bed while nursing wounds inflicted in a moment of carelessness or rage on the part of some more-or-less trusted animal.

Nearly all the lions you see in "acts" were born in captivity. There is good reason for that. Not only can circus owners purchase "home-grown" lions cheaper, but they also get healthier and more handsome animals.

Normally a good specimen costs $1,000. The price varies with age and appearance. Were we able to diagnose their future demeanor in the big cage, we could charge higher prices for some, while others would be given away merely to get them out of our sight.



Mr. Gay aboard Pluto, one of his favorite full-grown animals.



Little Leo regards himself in the mirror with some belligerence. The petting to which such cubs are treated when youngsters results in a familiarity with humans which may result more or less dangerously at a later age.

These two cubs will be worth around $1000 apiece when they grow up, depending on their appearance and dispositions.

Three Horses a Day Consumed by Gay Lions; Fast Every Seventh Day

Dispositions vary with individuals, and generally the place and circumstance of birth have no bearing on this. By that, I mean an unruly lion will be an unruly lion no matter whether he is born in Africa or at our farm in Southern California.

Six years ago this summer we had three babies born to one fine lioness. The mother abandoned them immediately, as indeed many lionesses do immediately after birth—unless, in fact, they destroy the young—and we found it necessary to raise them on goat's milk fed from bottles.

Presently one began to develop into a high-strung, nervous, irritable and vicious individual. The second showed little interest in goings-on. The third was quite docile. Like a human, the mean one insisted on being mean, and we never could reform him. After a time, he would try to bite his keeper's hand when he had finished his milk. Explain this trait, if you can. I cannot. All came from the same line of stock and had the same opportunities in life.

Fortunately for my soundness of body I make little effort to train them. I merely run a farm, a lion farm, raising and exhibiting African lions. Some mornings I may see 20 cubs issued into the world by six to eight unhappy mothers. Here is one event in which no man may participate. The lioness performs all the necessary functions without aid. Immediately after the birth, however, we frequently remove the young to prevent the mother from killing them.

Monogamy of Lions

This is especially necessary if only one is born. African lionesses seem to consider a single child unworthy of their attentions. If four arrive in the litter, they are far more apt to be spared. Why this is true I cannot say.

Many scientists have asserted that lions are monogamous. Ours are quite willing to have more than one mate. We may breed a particularly fine specimen to several lionesses in a single season. This birth-control method makes it possible to produce a sturdy, handsome race.

One day a jungle lion may gorge himself on a fresh kill, then abstain for two or three days. I feed our grown animals meat, once daily. Each receives his portion in his cage, unbothered by his mates who are feeding at the same time in adjoining cages. The males may be fed in the morning, the females in the afternoon. Precedence is not important, so long as they receive their meals regularly and on time.

On the seventh day they fast. What enormous appetites they have. At



At four months a lion cub and a dog can be playmates—but after another few weeks Fido had better run for his life when Leo gets his dander up.

Mr. Gay presents Pluto with a tidbit in the shape of a small fish. Pluto is a ten-year-old veteran of the Gay Farms, where the oldest animal is 17. The ripe old age of 40 is frequently attained by captive lions, though the normal life span in the jungles, where human and animal enemies abound, is said to be considerably less.

Captive Lions Best Looking Because of Diet; Cubs Get Milk and Eggs

the present time my lions consume three horses each day, a total weight exceeding one ton. These are animals having no economic value, who have outlived their usefulness. They are, of course, sound of body or I would not accept them.

While I make no effort to train these brutes, I do have frequent occasion to mingle with as many as 20 in a single group. Early in my career I learned that no lion can be trusted and, also, that their memory is short indeed.

This story will illustrate the brevity of their memory. I have appeared many times as a circus trainer of wild animals. One of my stunts was to place my head within the wide open jaws of a very large male. Before proceeding with this stunt, I called the animal to the center of the arena and excited him by flecking him with a whip. In the midst of his roaring, I ordered him to his pedestal.

Forgetting a Rage in a Split Second

Hardly had his haunches settled on his platform when I called him down again, pulled his mouth open with my hands and suffered my head to be encompassed by those enormous jaws. Not only was he deprived of enough leverage to clamp down, but also the break in routine had caused him to forget all the passion he had been working up less than a minute before.

Of course the ovation always was tremendous!

Some stories you hear are unbelievable, yet many of these are true. Lions may not be smart, but they are treacherous. For that reason we never turn one loose on our five-acre farm, even though it is surrounded by high fences. A system of chutes with sections hinged so they may be pulled out of the way when not in use, enables us to transfer lions from enclosure to enclosure, from cage to cage, at will.

After the third year every lion at some time works himself into a frenzy over some fancied grievance — or, mayhap, merely because he is savage and gives vent to his feelings. It is quite a common sight to see one of the big fellows lashing himself with his tail, his eyes open wide with hatred.

A renowned scientist announced recently he had obtained evidence that there grows at the tip of a lion's tail a claw-like object, presumably for the purpose of punishing himself the more severely during these tail-lashings, thereby to add to his native courage.

If any lion possesses such a claw I never have seen one and I have examined scores carefully in search for it.

I think that diet accounts in large measure for the beauty of domestic-bred lions. During the first eight weeks they subsist on goat's milk. We keep a herd of eight goats and a cow on the farm to provide food for the little ones. After the second

(Continued on page 123)

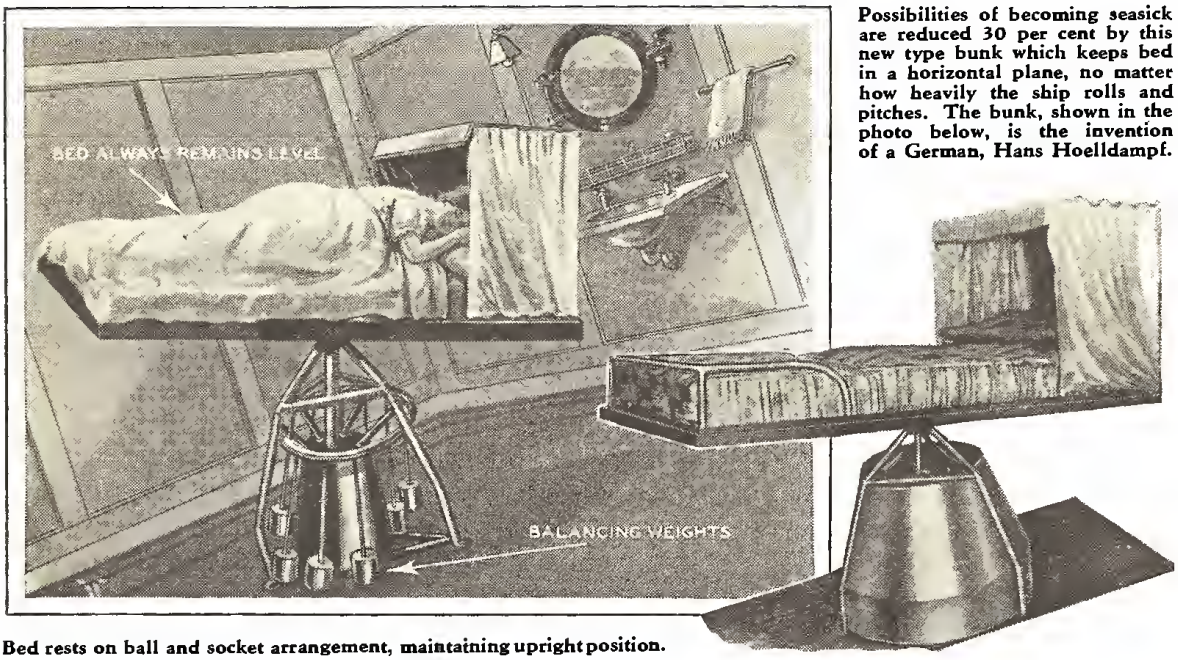


Lion cubs are bottle-fed on goat's milk with egg whipped in.



Children may be trusted with a cub, but not with a full grown lion. Lions are tricked into doing stunts which seemingly require great intelligence; actually, their reputation for smartness is misplaced, says Mr. Gay. Their memories are astonishingly short, as all lion-tamers know.

Weights Keep Ship Bunk Level in Storm, Cut Seasickness



Possibilities of becoming seasick are reduced 30 per cent by this new type bunk which keeps bed in a horizontal plane, no matter how heavily the ship rolls and pitches. The bunk, shown in the photo below, is the invention of a German, Hans Hoelldampf.

Bed rests on ball and socket arrangement, maintaining upright position.

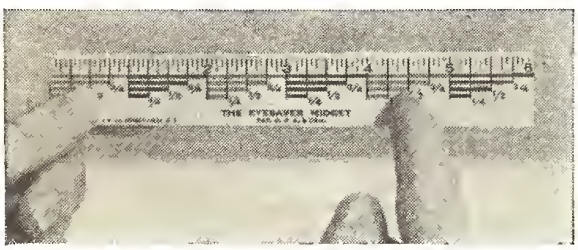
SEASICKNESS, that real terror of the sea, which often makes ocean travel an ordeal, is reduced 30 per cent by the development of a new type steamship bunk, inventors claim.

As shown above, the new bunk does not attach to the wall in the conventional manner, but rests on a ball and socket arrangement. What keeps the bunk always on a horizontal plane is a huge equalizing weight depending from the ball in the socket, as illustrated in the photo and drawing above.

Tests showed that passengers could rest comfortably in a storm when the ship was rolling over at angles of as much as 30 degrees. Stomach membranes thus avoid the severe disturbance which causes seasickness.

Dimensions on Rule Quickly Read

MEASUREMENTS can be read more easily and rapidly from a ruler now on the market which has the divisions marked off in red and black lines, as illustrated in the photo below. Beginning at the inch mark, the lines extend to the ¼, ½, ¾, and next inch mark, making measurement visible at a hasty glance.



Red and black lines extending from inch mark to the quarter inch divisions make scale easily readable at hasty glance.

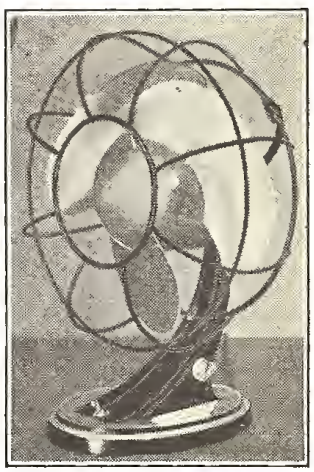
Ozone Purifies Water, No Bad Taste

A NEW method of killing germs in city water, designed to avoid the bad taste caused by chlorine gas purification, is to be tried out on a large scale by the Metropolitan Water Board of London.

The new germ-killer is ozone, already much used to destroy odors and kill germs in the air. In applying the method to water, a small amount of ozone is created in a stream of ordinary air by an electric device which converts some of the air oxygen into ozone. This ozonized air then is blown into the water to be treated, much as now is done with chlorine. The ozone method is said to cost more than chlorine but has the advantage that bad tastes in the water are destroyed.

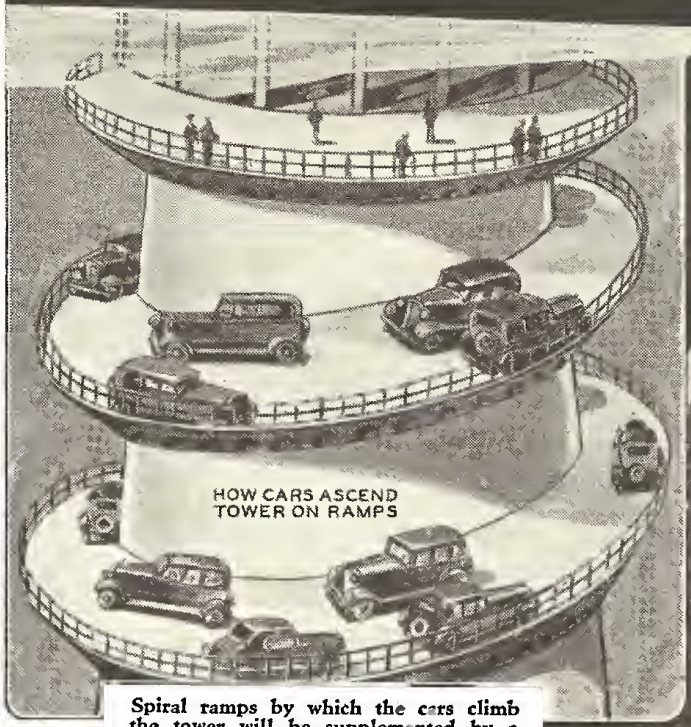
Fan Runs in Complete Silence

RUNNING with the utmost silence, a fan recently developed in engineering laboratories bids fair to win popularity among people easily irritated by annoying sounds. Sound elimination is made possible by widening and shortening blades, and thus doing away with excessive vibration. Motor is enclosed in the hub to further cut down whirr.



Annoying whirr is eliminated by unusual shape of the blades.

Pleasure-Tower Half Mile High



Spiral ramps by which the cars climb the tower will be supplemented by a series of elevators within the structure.





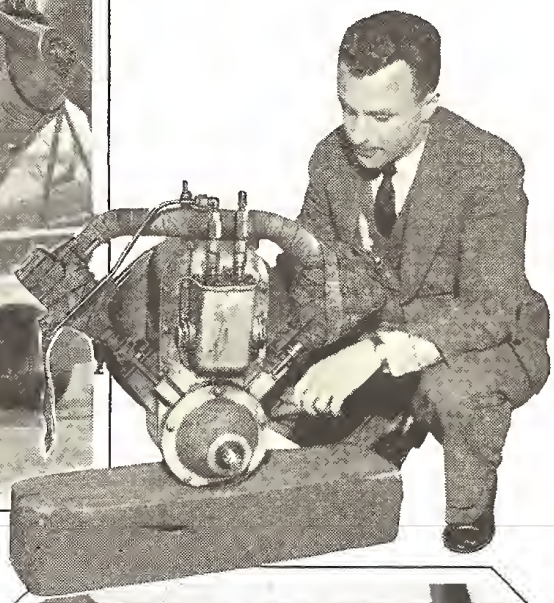
Towering almost half a mile above the ground, dwarfing such gigantic structures as the Empire State Building and the Eiffel tower, a huge concrete tower 2300 feet high, surmounted with a beacon and built with a spiral ramp for autos to climb up its sides, stuns the imagination with its vastness. It is the design of the French engineer, M. Freyssinet, intended for the 1937 Paris Exhibition. He estimates the cost at less than half the Eiffel Tower, or in the neighborhood of $2,500,000. It will be called the "Phare du Monde," or Lighthouse of the World. The project appears far removed from the visionary and a new all-time "high" in buildings seems in a fair way to being achieved.

500-lb. Steam Engine Flies Airplane—Burns Oil for Fuel



Inventors William and George Besler with plane which they equipped with steam engine weighing 500 lbs. and developing 150 h.p. 7-minute test flight proved its practicability.

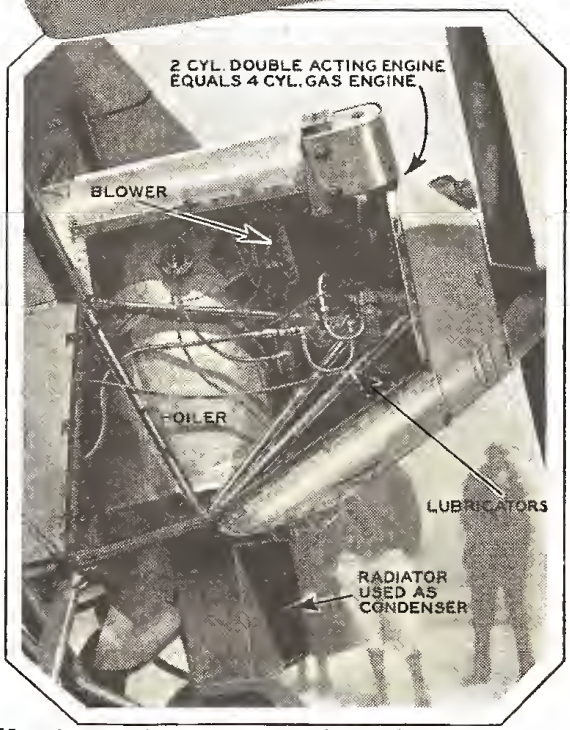
Below is seen the inventor with the steam engine which burns cheap oil for fuel.



AFTER years of experiment involving countless disappointments on the part of scores of inventors, a steam power plant light and powerful enough for airplane use has at last been developed which will actually carry a plane into the air and keep it there just like a gasoline motor.

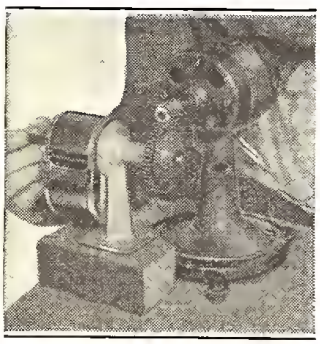
This epoch-making feat has been accomplished by George and William Besler, who put their steam-powered plane through its paces at Oakland airport a few days ago. The engine was fitted into an ordinary training biplane and on the test hop made a successful seven-minute flight.

Weight has always been the bugbear which has stood in the way of steam plants for airplanes. Many early attempts at airplane design would probably have been successful had it not been necessary for the inventors to use steam, gasoline power being unknown at the time. The Langley airdrome is an example of a ship which might have flown if it had had a less cumbersome power plant.



Here is seen the power plant of the plane and the 40-gallon fuel oil tank. Beneath the fuselage are the condenser coils. Steam is generated in a boiler beside the fuel tank.

How to Motorize Pencil Sharpener



Motor is geared to sharpener.

A PENCIL sharpener which has a lot of work to do can be motorized by removing the handle and replacing it with a 50-1 brass gear of the worm type. Then mount a small motor in the position shown and solder onto the shaft a worm gear.

Human Body Is Electric Battery

THAT all human beings work like electric batteries is indicated by recent experiments by a French scientist. In a startling experiment babies placed in special insulated cribs were found to develop different electric voltages on different days, as though each child contained some kind of invisible battery or dynamo. Recently he tested four adults wearing electrodes. Electric voltages amounting to as much as half a volt were encountered.

Oddities of SCIENCE

by NIC SPRANK



EXPLANATION OF THESE ODDITIES ON PAGE 125

ONE DOLLAR will be paid by Nic Sprank for oddities of science used on this page. Send in your ideas—no limit to the number of suggestions you may make, but be sure to enclose proof of your statements. Maybe your ideas will be better than those shown on this page—if they are, Nic Sprank wants them and will be glad to send you a check. Address suggestions to Nic Sprank, care of Modern Mechanix and Inventions, 529 South Seventh Street, Minneapolis, Minn.

BATTLES in CODE for



Censors treating suspected communications with chemicals during the World War to bring out secret inks which may have been used by spies.

by THOMAS M. JOHNSON

Amazing secret battles of spies and cipher experts, involving the use of codes and cryptograms on which hung the lives of millions of men in the trenches, played a vital part in determining the course of the World War. Kept secret for years in confidential archives, some of the startling exploits of American cryptographers are brought to light here.

"THE enemy has our secret code!"

The dread tidings were whispered through the corridors of Washington; War Department, State Department, even the White House. They brought a cold chill of fear. Could it be that at the climax of the greatest fighting effort in our history, the Germans were reading our leaders' most confidential messages, knew their inmost thoughts and plans? We must stop that, at once.

So in that thrilling summer of 1918, a hidden combat raged unknown, between the code and the cipher experts of the German and American secret services. The battlegrounds were official Washington, hostile Mexico, European neutral countries rotten with intrigue, in the air, under the sea, in the bowels of the earth — the trenches. Everywhere, the Germans struggled to find out our plans to hurl our million fresh troops into battle; everywhere, we struggled to conceal those plans. No wonder, when from our own secret service had come this report:

"The Germans got our secret code from a spy—a spy, and in our own code and cipher room, here in Washington!"

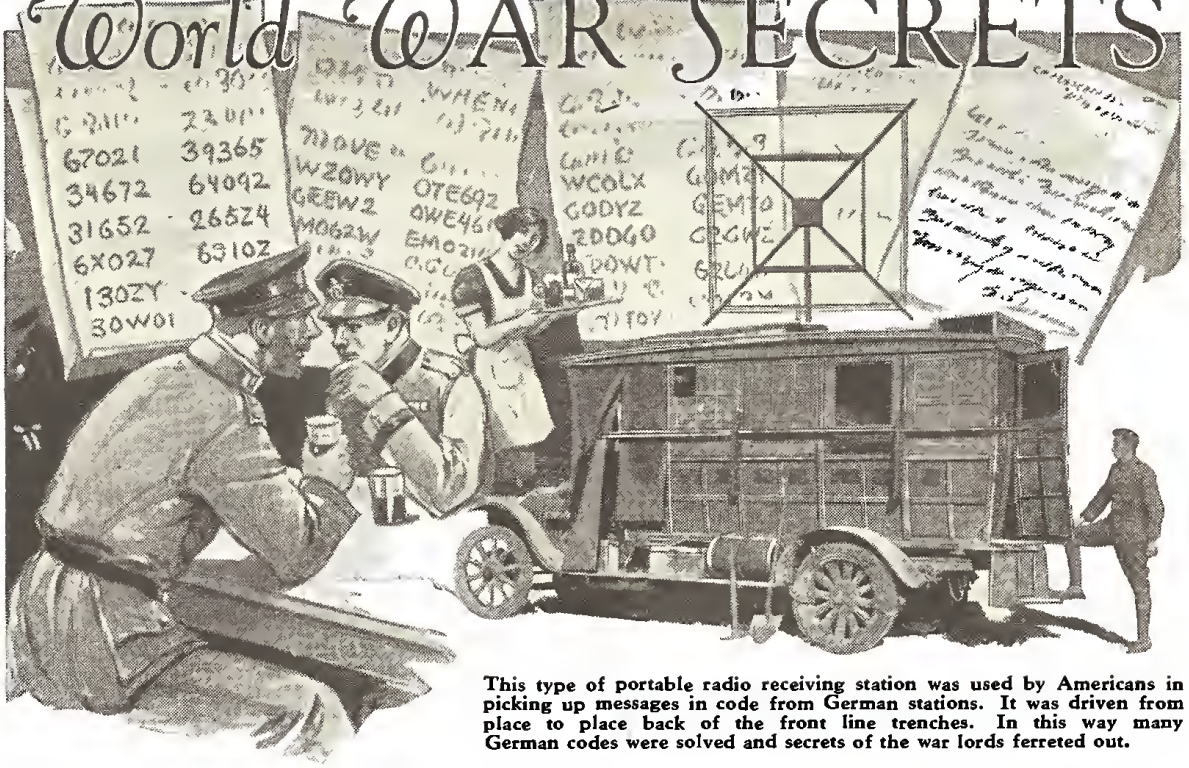
Our own code and cipher room, an inner recess of the massive brick building, secluded, safe, that housed the best brains of the Army War College. Here, by patient work, we had assembled the cleverest of American experts in this occult science of hiding the most important orders, plans, policies beneath a puzzling string of numbers or strange symbols.

Aided by records and paraphernalia brought from the secret department of Col. George Fabyan's Riverbank Laboratory outside Chicago, they compiled codes and ciphers to mask our confidential communications over the network of cables and telegraph lines that covered the world, and even through the air itself, by radio. These men held their country at their mercy—if one of them turned traitor—

A Spy in the Cipher Room!

No wonder strong faces paled, when a few of our leaders heard, in strictest confidence, the strange story a strange man had told General Marlborough Churchill, then chief of our Military Intelligence Service. This man, who came secretly by night, was one of the cleverest American spies in the World War. Unknown, he played a large part in preventing invasion of Texas by Germans and Mexicans. This time, he had come straight from the German spies' nest in Mexico City, bearing a photograph that he had stolen.

World WAR SECRETS



This type of portable radio receiving station was used by Americans in picking up messages in code from German stations. It was driven from place to place back of the front line trenches. In this way many German codes were solved and secrets of the war lords ferreted out.

It was a photograph of a man with a German name, who was then a trusted cryptographer in the American code and cipher room in the Army War College in Washington. He was one of the trusted men who composed the codes and ciphers in which our important messages were to be concealed, and to whom were handed over similar messages sent by German officials, secret agents or spies, that had come into our hands and must be solved correctly and honestly. But now!

"There's your leak!" cried the man from Mexico.

In a Nest of Spies

He was Dr. Paul Bernardo Altendorf, an Austrian, turned American. Posing as a German-American draft dodger, he had gone boldly to Mexico City, wormed his way into the group of desperadoes, bomb-makers, incendiaries that German Minister Eckhardt had working against the United States. He even lured one of them, the famous Pablo Waberski, across the border into Texas, to be captured by the Americans and sentenced to death. Then, with cold courage, Altendorf had turned around and returned to Mexico, where, if his trick were known, his life would not be worth one peso. But he wanted to keep a date there with Kurt Jahncke, German Master Spy, who is now a member of the Prussian Diet.

The date was at the apartment of an attractive German-American woman, who had assembled the choicest of Jahncke's spies and saboteurs, who boasted they would slit the throat of any dirty American spy. Altendorf made himself agreeable, sauntering about, admiring the apartment's decorations. This admiration led him to recesses.

Suddenly he stopped, amazed. Before him was a photograph of a man he had seen before—before—but where? Ah—in Washington! But where, in Washington? And how?

A step sounded in the passage. Altendorf wheeled about.

"Ah, Senora," he exclaimed. "Pardon that I withdrew a moment, led astray by these tasteful decorations. So many interesting things! Now, who is this man so handsome—though in *your* apartment, he could be only handsome!"

Disarmed, his hostess blushed, then said, "That is my friend, Rudolph Metz."

Tracking Down a Suspect

Rudolph Metz! That was the name, Altendorf exulted. Rudolph Metz—Washington—ah, the Army War College! The room where the code and cipher men did their secluded, vital work! Yet among these picked men, supposedly trustworthy until death, he had seen this man—who was the "friend" of a notorious German spy! He managed more gallant speeches as he sauntered back with his hostess—having noted that, outside the window, was a balcony.

An hour later, the American spy dropped quietly from that balcony, and flitted away in the Mexican darkness. Beneath his coat, he clutched the photograph of Rudolph Metz.

That story sent General Churchill hurrying to the code and cipher room.

"Why, Metz was sent to us by a woman," they told him. "A woman member of our



Kurt Jahncke, chief of the German Secret Service in Mexico during the war and leader in plots against the United States. Mexico was a hotbed of spies because of its friendliness to Germany. This faded, cracked photo came from secret files.

own secret service. Why, it was 'Pandora'!"

"'Pandora'!" General Churchill exclaimed in amazement. He knew "Pandora." The name camouflaged an American woman who played a fascinating role, guarding a box of secrets of the Texas border that she had solved, for she was an expert cryptographer. She was the wife of an American government official.

"But 'Pandora' is loyal, beyond suspicion!" General Churchill cried.

No doubt of that, her explanation showed. She had recommended Rudolph Metz when the War Department first commenced searching for cryptographers. He had helped her decipher Mexican secret messages, and he seemed a loyal American citizen. Apparently, he was trustworthy.

The Spider's Web

But to confirm that, sleuthhounds of the Military Intelligence gave him such an investigation, past and present, as few can survive. They found him blameless of his "wife's" Mexican activities, and no evidence that he had been recently in communication with her. He seemed, like most German-Americans, loyal to this country. So they let him remain at the very center of the web, knowing many of our profoundest secrets—but not really, the spider, but the fly—for always, he was under watch. Now, he is out of Government service.

But the investigation of him was part of a search that was not in vain. Its urgent warnings went out all over the world, to all who handled American secret communications or code books, and disclosed another possible leak, again through a woman, who was close to secrets—and trouble.

She was the daughter of an American diplomat in a neutral country that was honeycombed with spies. Also, she was the wife of a German Naval Officer. She lived with her father, who enjoyed his "enemy" son-in-law's frequent visits "on leave."

A German With the Code Book!

"That husband of yours is a good fellow, German or not," he told his daughter. He made the young man free of house and office. At the office, the diplomat kept his copy of the American secret code book—and not in the safe, but in his own desk. One day when he was out, the son-in-law called.

"I will wait," he said, and stepping into the private office, he closed the door. Presently, a clerk peeped in. There sat the German, feet cocked on the desk, smoking one of his father-in-law's cigars, and calmly perusing the code book! The clerk was aghast. He went to the Chief of the American secret service in that country.

That gentleman assigned to the case a woman spy, just arrived from Washington. We will call her Estelle. She had taught French in a fashionable American girls' school, and now occupies a higher position in a similar institution abroad. She was very beautiful, ambitious, but quite inexperienced in secret service. Nevertheless, to the diplomat's office she went, gorgeously arrayed as a tourist.

"I am an American just arrived," she said, "and I want information about a trip."

Lives Hanging on a Code

She flashed her most charming smile—which promptly proved her undoing. The diplomat might not suspect a German naval officer son-in-law, but he knew about women spies. He arose, majestically, pointing to the door.

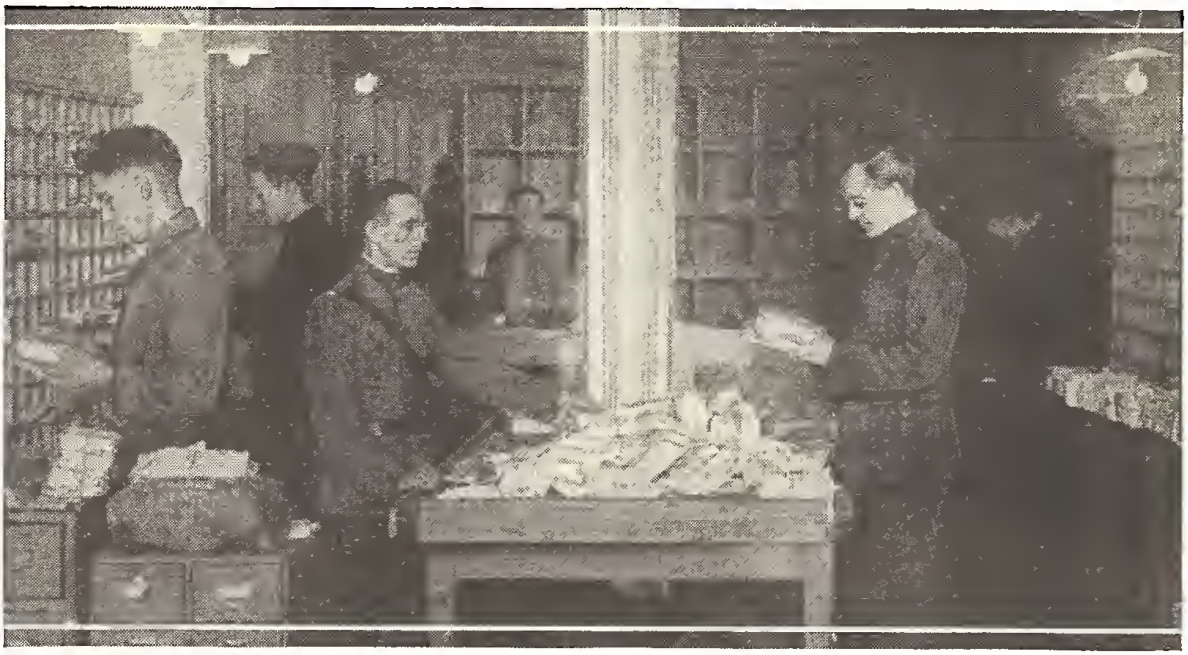
"Madame, you are a spy!" he said, dramatically. "Go back and tell whoever sent you, that you can't fool me with your smiles."

Its woman spy foiled, the local secret service got the State Department to send an inspector.

"Absurd suspicions!" exclaimed the diplomat. "Why, my son-in-law and I are *friends*."

Which seemed to him a sufficient answer. But his son-in-law had been seen in a stationery store, buying thin tissue paper. How easy to trace the groups each with a hidden meaning vital to American success, from that code book so accessible to his prying eyes. The situation was so serious that there was a conference at

Doughboys' Letters Carefully Censored to Prevent Leakage of Vital Secrets



All mail to and from doughboys passed through the base censor's office, where millions of letters were distributed. Precautions were taken to prevent vital information from leaking to the enemy, since men in the front line trenches were in excellent position to acquire knowledge which, innocently or deliberately on their part, could play into the hands of Germans.

American General Headquarters in France, and over the cables that night went to Washington a message in a new code that General Pershing's experts knew the Germans had not seen:

BELIEVE GERMANS MAY HAVE CODE NUMBER 471 SHALL STOP USING AND ADVISE YOU DO THE SAME.

Happy in the thought that America had won a point in the secret combat, the chief returned home—to face a startling new move.

"A woman to see you," they told him at the office. With his foot, he pressed a buzzer, and as his confidential man slipped behind a screen to listen, there entered a caller, heavily veiled, nervous—probably, he thought, a professional spy.

Machinations of a Woman Spy

"I have most *won-der-ful* information for you!" she said, in a deep, thrilling whisper. She raised her veil, revealing a striking, dark face. "You will pay me well?"

"Perhaps, Madame," the Chief replied. "But only after we have seen the goods."

"The goods?" the lady repeated. "Ah, yes. Well, Monsieur, turn your back."

When the chief looked again, she handed him, with an arch smile, a typewritten official paper. With a start, he recognized it as a copy of an order from the German Navy Department to a submarine commander. He was to cross the Atlantic, and cut the undersea cables connecting America and Europe—and to judge from the date, was even now arriving in American waters. No time to find out whether the paper was a fake. Not a moment to lose!

"Yes, Madame," said the Chief, "we will pay for this."

Hurriedly he composed, in the new code, a cablegram to General Churchill, warning of this new menace to American communications. Perhaps, he worried, all the cables have been cut already, and the warning comes too late. But he got this reply:

"What the hell? Four cables were cut—*yesterday!*"

The Chief's remarks were in a very ancient code. Long afterward, he had a friendly chat with an Austrian who had also been in secret service in that neutral land.

"We certainly thanked you for taking the Baroness off our hands," he said. "That woman we sent to tell you about the cable-cutting."

"Was she a Baroness?" the American replied. "Her news was stale."

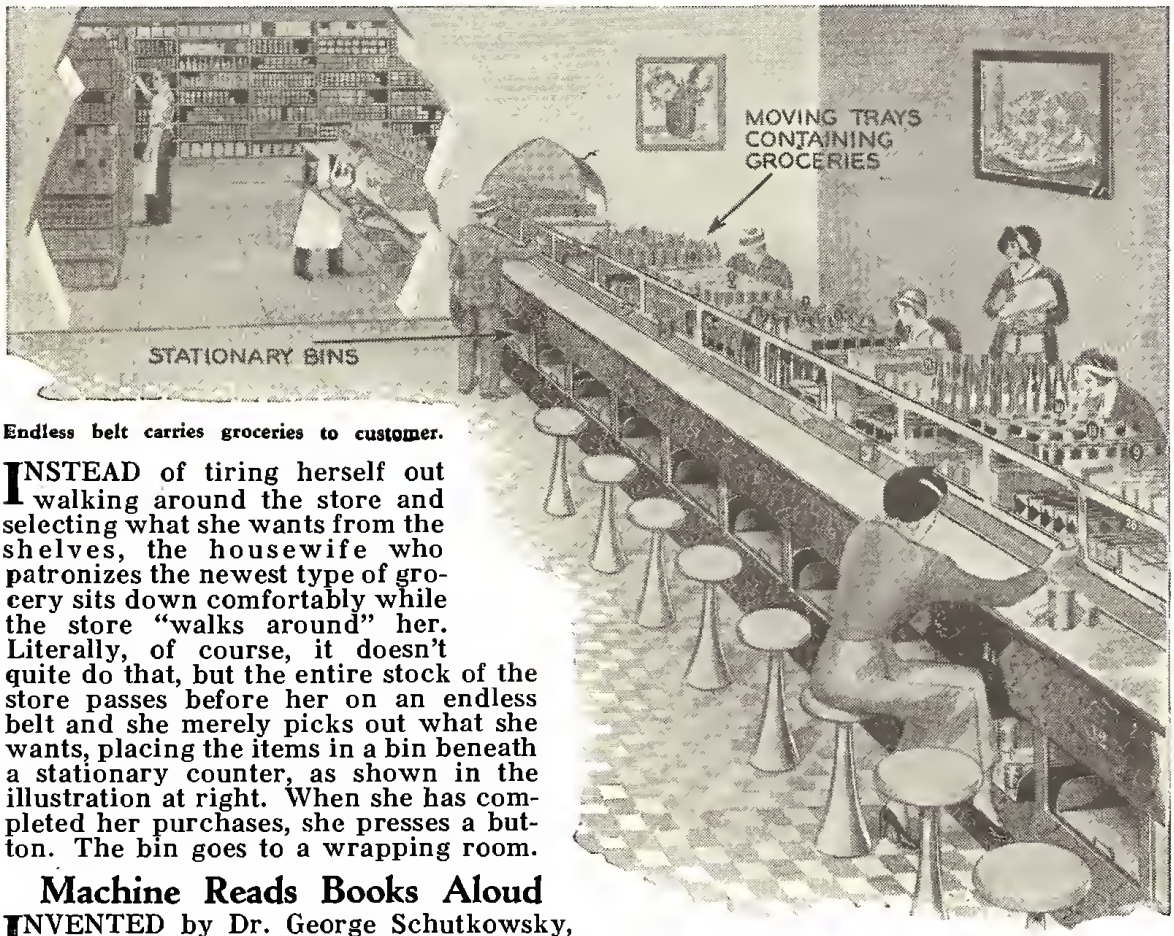
"But, of course," the Austrian smiled. "She was a professional spy, who pestered us so, looking for work, that to be rid of her, we gave her that paper to sell you—of course, a day late. You paid her so well, she retired."

The Silver Greyhounds

But after all, we laughed last. The cable-cutting emergency had not been unforeseen. The Navy was forewarned before the first German submarine reached American waters—equipped with cable-cutting shears. But fewer cables were needed, for the Silver Greyhounds were ready. That was their emblem, a picked corps of young officers who carried dispatches, maps, charts, and

(Continued on page 127)

Mechanical Grocery Store Walks Around the Customer



Endless belt carries groceries to customer.

INSTEAD of tiring herself out walking around the store and selecting what she wants from the shelves, the housewife who patronizes the newest type of grocery sits down comfortably while the store "walks around" her. Literally, of course, it doesn't quite do that, but the entire stock of the store passes before her on an endless belt and she merely picks out what she wants, placing the items in a bin beneath a stationary counter, as shown in the illustration at right. When she has completed her purchases, she presses a button. The bin goes to a wrapping room.

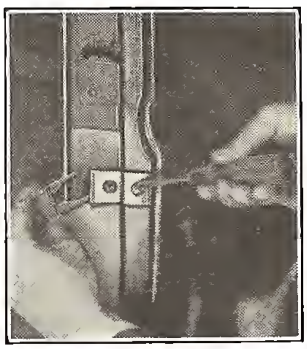
Machine Reads Books Aloud

INVENTED by Dr. George Schutkowsky, an engineer of Berlin, Germany, the extraordinary machine shown below is designed to convert printed matter into vocal sounds, thus making ordinary books and newspapers "readable" by the blind. No details of the operating principles of the device are available.



This mechanism is claimed to convert type into sound.

Making Auto Doors Open Easier



TO SUPPLY auto door latches with a constant source of lubrication, preventing their sticking and becoming hard to handle, a new little device has been put on the market which slips under the plate which forms the door latch. Only two screws need be loosened to install the lubricator. Two prongs fit under the plate out of sight and only the lubricant end protrudes, where the door catch comes in contact with it.

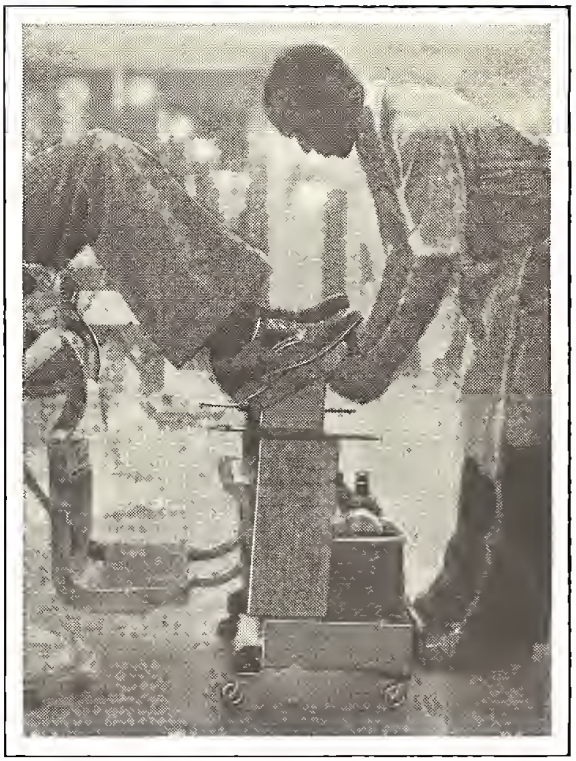
One in Four Dies of Heart Disease

CALCULATIONS of a large life insurance company indicate that one in every four adults over the age of 50 will die of heart disease, now the commonest single cause of death in the United States. For white boy babies at birth, one out of every five will eventually be carried off by the ailment. Women are more susceptible.

Shoeshine Stand Rotates as Unit With Barber Chair

A NEW departure in barber shop equipment is a shoeshine stand which clamps to the footrest of a barber's chair. With this attachmcnt, the barber is in no way inconvenienced by the shoc-shining procedure, for the chair and the stand can be rotated as one unit.

The shoeshiner, too, benefits, for he does not have to stop each time the barber turns the chair in some other position. As shown in the photo, the stand rolls on casters, and holds the shining paraphernalia like the regular stand.



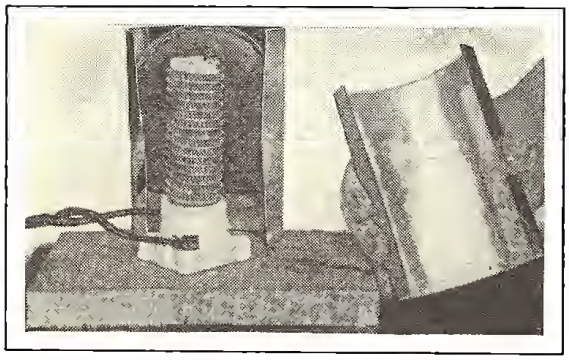
New shoeshine stand clamps in position shown here and rotates as one unit with the chair, thus making it unnecessary that the shiner stop every time chair position is shifted.

Cancer Treated With Stale Butter

RANCID butter, or rather the chemical callcd butyric acid which bacteria form in fresh butter, is the newest cancer treatment reported in England by a famous surgeon.

The acid of rancid butter is not to be eaten or injected but is applied directly to the cancerous growth. For some reason, which still is mysterious, the butyric acid bites much more viciously into the cancer tissue than into the healthy tissues which surround it. A graduatcd dose of the acid can kill and eat away all of the diseased cancer cells without damaging the nearby healthy ones. This is the same way that radium attacks cancer.

Improvising an Electric Toaster



Toaster is contrived by mounting heating element on baseboard and attaching tin bread holder in position shown here.

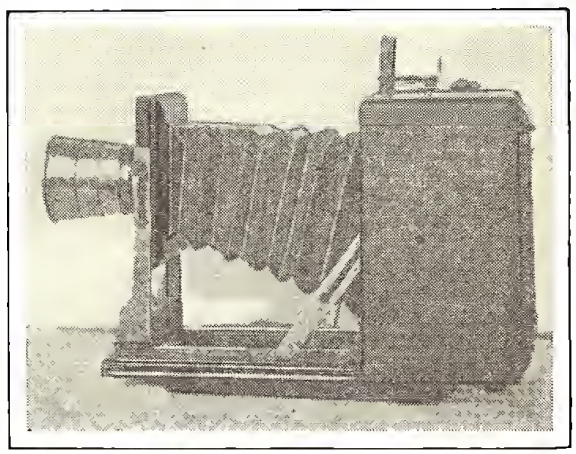
WHEN the family toaster gives up the ghost, you can quickly rig up an emergency job. First raid the bathroom and lay acquisitive hands on the element in your heater. Then screw the hcater in a standard light socket, which has been mountcd on a board as illustrated above.

As holders for the toast, cut out two little pieces of tin and bend them to the shape shown, using a piece of bread as a guide for measurements. The tin sheets may be placed as near to the heater as you wish. Distance, of course, will determine the speed of the toasting.

It can be slow or fast, just as the majority of the family desires. This cannot be done with toasters costing many times the price of this simple improvised device.

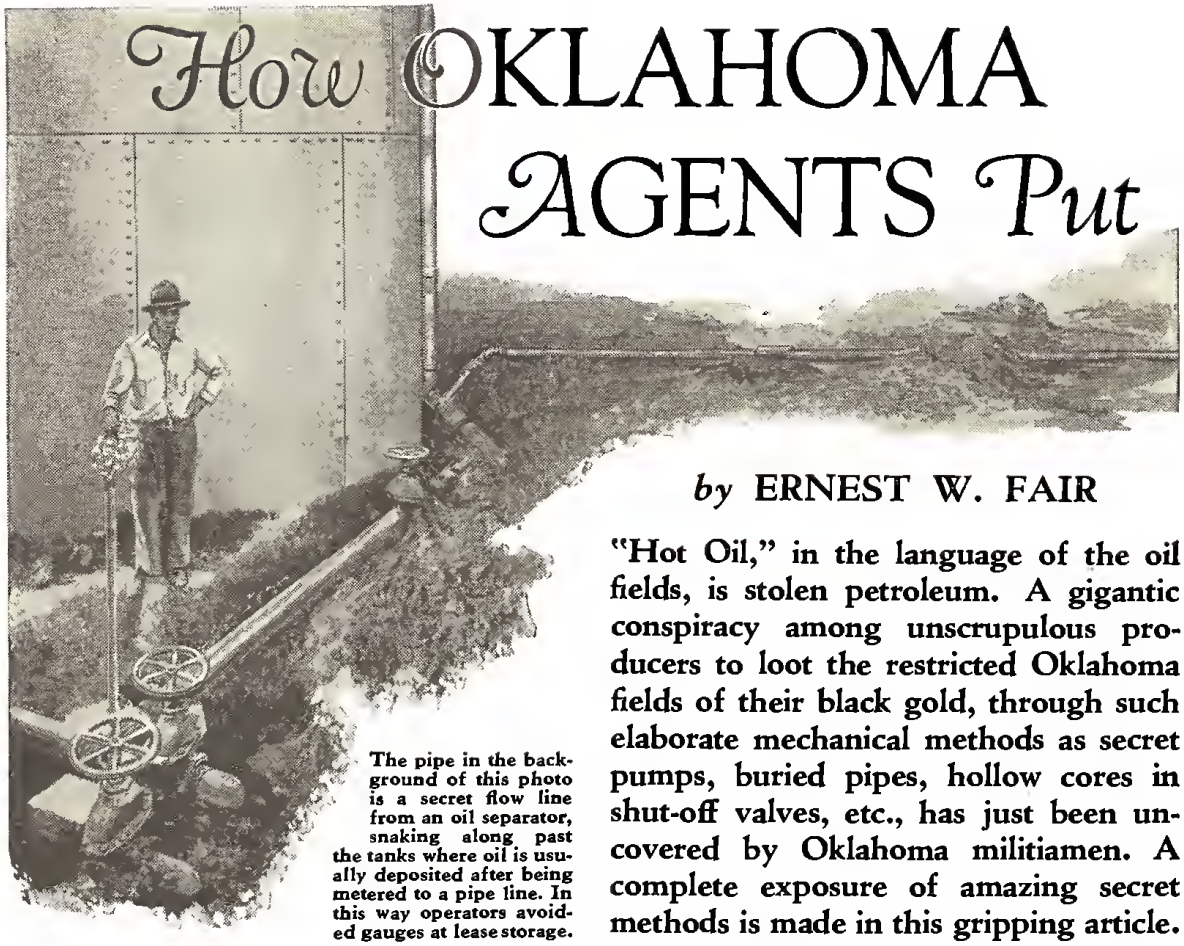
Preventing Halation in Pictures

HAVING trouble with halation in your picture-making? If so, try this stunt. Obtain from a dime store a collapsible aluminum drinking cup and paint the interior dull black. Each section of the cup is of a larger aperture, and one of these sections will fit over any lens barrel. By opening the remainder of the sections an effective lens shade is constructed. When not in use, the sections are pushed together over the lens barrel and the camera front closed. It's advisable to paint the interior when the cup is opcned as wide as it can go.



Halation on pictures is prevented by fixing over lens a collapsible aluminum cup, which should be painted black inside to prevent reflection of light. Push cup in when not in use.

How OKLAHOMA AGENTS Put



The pipe in the background of this photo is a secret flow line from an oil separator, snaking along past the tanks where oil is usually deposited after being metered to a pipe line. In this way operators avoided gauges at lease storage.

by ERNEST W. FAIR

"Hot Oil," in the language of the oil fields, is stolen petroleum. A gigantic conspiracy among unscrupulous producers to loot the restricted Oklahoma fields of their black gold, through such elaborate mechanical methods as secret pumps, buried pipes, hollow cores in shut-off valves, etc., has just been uncovered by Oklahoma militiamen. A complete exposure of amazing secret methods is made in this gripping article.

SEVEN million barrels of oil "stolen"!

The far-flung rackets of illicit oil producers of the great Oklahoma City oil field, one of the largest in the world, make the activities of Chicago's racketeers seem like children's games. The Teapot Dome scandal dwindles to insignificance in comparison with this Three Million Dollar swindle of royalty owners, producers, and even the sovereign state of Oklahoma itself.

Far into Canada where the "hot oil" rings bartered for the sale of Oklahoma's illicitly produced resources, to the Gulf of Mexico where mighty tankers stood ready to carry the crude to foreign countries, the ramifications of the crooked syndicate spread.

Secret Traffic in Black Gold

For months the oil flowed through hidden pipes, glided noiselessly past valves with hollow cores, sped into pumping stations buried deep in the ground and finally arrived at waiting carriers where it was sent to market.

In less than a year 7,000,000 known barrels of this oil were stolen. Yet investigators under Lieut. Col. Cicero I. Murray admit that millions more remain yet to be discovered.

Hundreds of thousands of dollars were swindled from royalty and property owners . . . tax revenue that might have enabled Oklahoma to free its citizens of ad valorem taxes remained unpaid and last, but by no means least, more than $2,500,000 worth of oil was stolen from the pools of honest producers who remained almost helpless.

Oil basins resemble a great oat bin with many outlets. If all openings remain open each will flow an equal amount of the contents of the bin to waiting containers. But should one section be opened and all others closed the one outlet will soon drain the entire bin of all the oats.

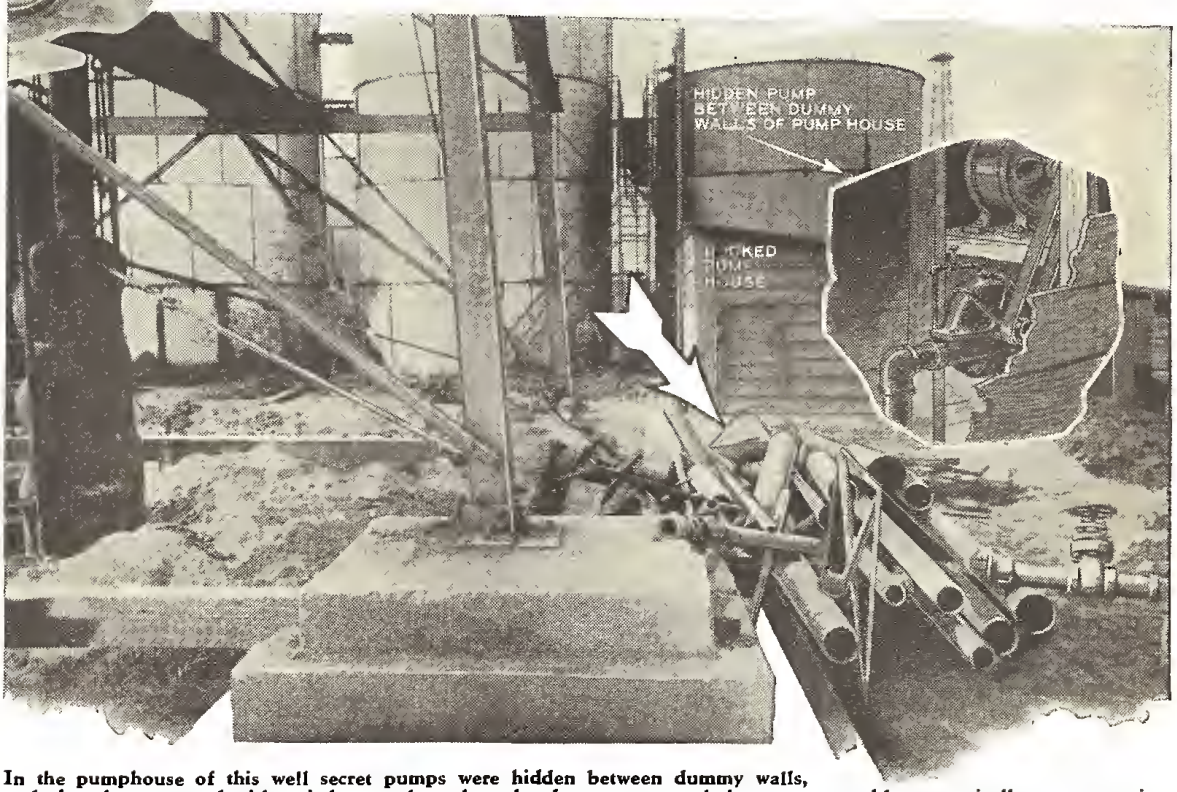
Thus on every pool of oil there are many wells, each draining the precious black gold from a common source. If some are closed and others remain open the closed wells lose their rightful share of the crude in the pool.

So the "hot oil" wells, running against military orders and gentlemen's agreements among producers, drained the field. Before we can clearly understand the amazing theft of a fortune in oil we must consider the causes that brought the condition making this theft possible into existence.

Why the Wells Were Restricted

Three years ago the oil markets of the world were flooded with petroleum. New fields kept coming in. There was more oil to be sold than buyers could purchase. The price crept slowly downward . . . the old law of supply and demand was in operation.

Hot Oil ON the SPOT



In the pumphouse of this well secret pumps were hidden between dummy walls, and cleverly connected with switches so that when the door was opened the pumps would automatically cease running. The arrow points to a mass of pipes in foreground which conceal the valve used to regulate oil flow from the pump.

Royalties are based on a percentage of the selling price of the oil; so too are state gross production taxes. As prices came tumbling down so also went not only profits to producers but royalties to oil owners and taxes to the state.

The state of Oklahoma saw its natural resources being thrown away. From $4 a barrel the price dropped to $2 and finally to $1.

And then one of the largest fields ever discovered came in . . . the new Oklahoma City field with undreamed of quantities of the highest grade crude gushing across the tops of the giant derricks.

The new flood of oil sent prices even lower. So proration was born. Under its rulings the oil buyers came to the Oklahoma state corporation commission each month. They told how many barrels of oil they would take at the current price. Governor William H. Murray had closed every well in the state by executive order, placed them under the guidance of a field umpire. The Corporation Commission divided the orders among the wells and each was allowed to produce only its share.

Thus with the birth of proration the nefarious plans of the crooked oil producers began to ferment.

At first all went well. Then came a mighty flood of oil from a new field in East Texas sending prices downward beyond control. Producers chafed under the rulings that held their production down. Some ran their wells in open defiance of the commission allotments so that they might sell the crude at any price.

Martial Law Clamped Down

Once more Governor Murray acted. He placed the fields under martial law, ordering his cousin Lieut.-Col. Cicero I. Murray to take charge.

Honest producers found their wells weakening . . . they knew that somewhere in the field someone was producing oil illegally . . . the market reports showed clearly that more oil was coming onto the market than records showed had been produced.





Showing storage tank with secret fire hose connection in the foreground. At the left end of hose is the secret connection, which was buried. Regular connection to tank is the circular plate in center of picture. The hose was rolled up and stored after use so investigators were unable to find it. At left, pipe line header gates exposed by militia, showing connections used for transportation of "hot oil."

But where was it coming from and how was it being produced?

Militiamen with loaded rifles and fixed bayonets patrolled every well in the field. None were apparently operating without Corporation Commission permits.

Secret investigators went to work. Highly trained engineers under Col. Murray used every instrument known to modern science to unearth the secret producing and transporting methods that all knew existed. A highly complicated spy system searched into every known record, listened in on secret conferences and employed every artifice known to man to bring to justice the men whose thievery knew no bounds. It was war! War against crime . . . neither the Governor nor his cousin knew what failure meant . . . night and day their men worked delving into the secrets whose discovery would bring to light the million-dollar criminals.

Hidden lines were discovered . . . crews of laborers dug these lines up night and day, but they seemed to lead nowhere. A maze of pipes confronted the investigators. Engineers were called in and finally the hidden lines were traced . . . new secrets were unearthed . . . hidden rooms dug beneath the surface of the ground were discovered. The methods of the "hot oil" syndicates were slowly unearthed and made public. It was an amazing story almost impossible of belief.

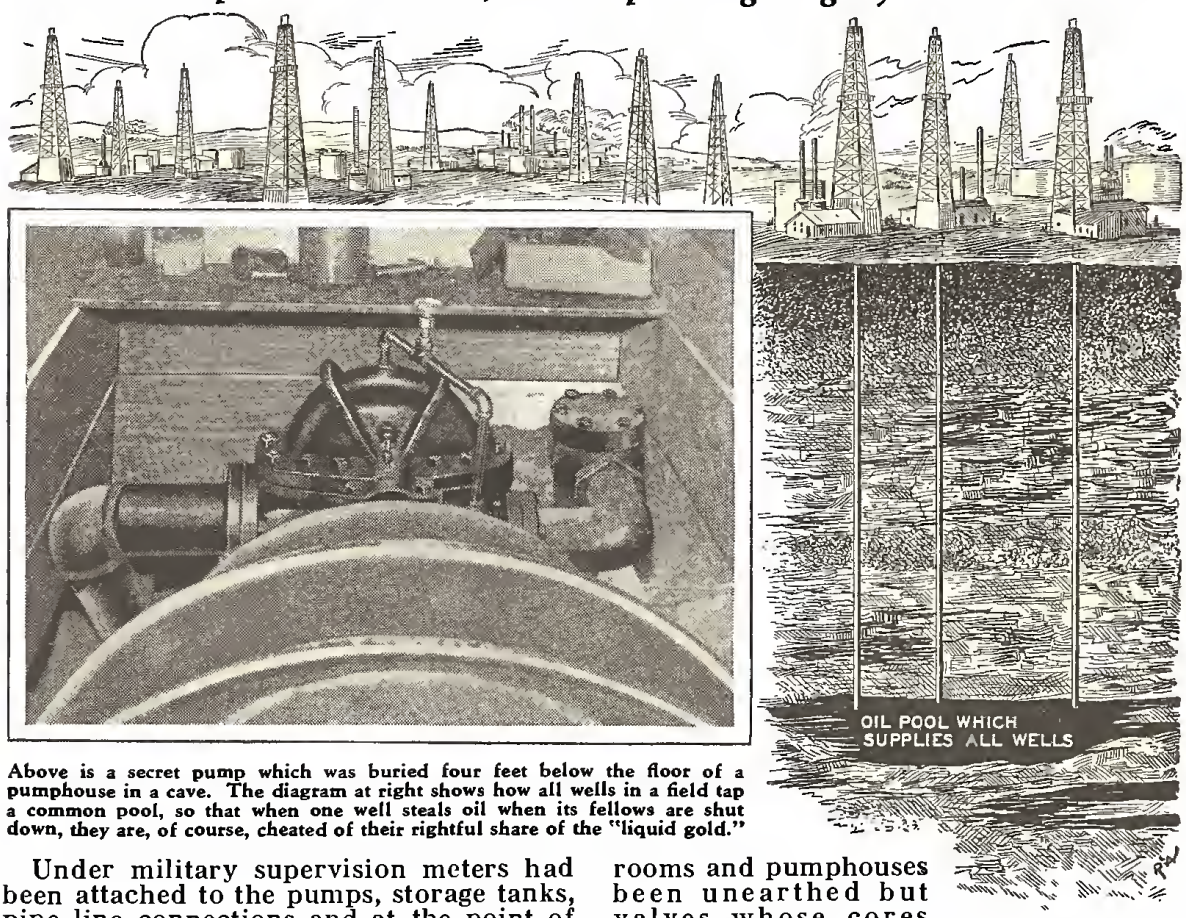
In the beginning the crooked producers had laid only the secret lines, hiring workers at night, confusing these laborers in the operations so that even they could not remember where the lines were laid.

To get the oil to distant loading racks underground control rooms and pumping stations were built. Lines were laid into the very cellars of some of the wells and in one or two instances producers were daring enough to make the connections in the well-cellar direct into the string of the flow casing.

Wells belonging to the illicit producers had been rigged for transportation of the "hot oil" long before they were brought in. Highly paid crews labored under cover of night to lay the lines.

Under ordinary conditions oil is brought to the surface by gas volume. It goes into a device called a separator which separates the gas from the oil, then into a flow tank where the sand and impuritics are dropped to the bottom, then to a stop tank. A pump picks up the oil at the stop tank and forces it into a pipe line by which it is delivered to its destination which may be a huge storage tank, refinery, or railroad car-loading rack.

Oil Wells Tap Common Pool; Well Operating Illegally Cheats Its Fellows



Above is a secret pump which was buried four feet below the floor of a pumphouse in a cave. The diagram at right shows how all wells in a field tap a common pool, so that when one well steals oil when its fellows are shut down, they are, of course, cheated of their rightful share of the "liquid gold."

Under military supervision meters had been attached to the pumps, storage tanks, pipe line connections and at the point of delivery.

Meters and producing systems meant little to the "hot oil" producers. One company used a large rubber hose attached to a secret pipe at the bottom of one of its stop tanks to pick up oil with a secret pump when the well apparently was shut down.

Others put by-passes on the wells while they were being connected for final completion. One flow line went to the battery of tanks and the other went directly to the hidden pipe lines.

On one well the operators built a special pipe line two miles long. At the end of the line a suction pump sucked the oil out of the wells. Usually it is boosted by gas pressure.

Maze of Hidden Pipelines

Down under the ground four or five feet pipes had been laid around the stop tanks taking the "hot oil" straight from the separator and carrying it by secret electric pumps into pipe lines or to fake refineries.

The discovery of the first lines made through unceasing work on the part of Col. Murray and his investigators led to the ready discovery of even more complicated and intermingled lines, so dexterously laid that even the crews who dug them out could not figure either where they came from or what their destination might be.

Not only had underground control rooms and pumphouses been unearthed but valves whose cores were bored out so that when closed by the screws on the outside they continued flowing were discovered.

Even innocent-appearing pumphouses were so built as to camouflage secret equipment. False walls hid electric centrifugal pumps operating almost silently. Double walls of pumphouses were found so constructed as to absorb all noise or vibration. Military officers in one instance discovered electric connections between the secret pumps and the pumphouse doors. When inspectors opened the doors the connections automatically disengaged the secret pumps.

Everything looked all right and the inspectors went on to the next well, while the producer chuckled.

Thus millions of barrels of oil were stolen until the methods of the "hot oil" producers were discovered. Now military guardsmen patrol the outlaw wells while investigators dig deeper into the field searching for more and more hidden lines and ingenious devices.

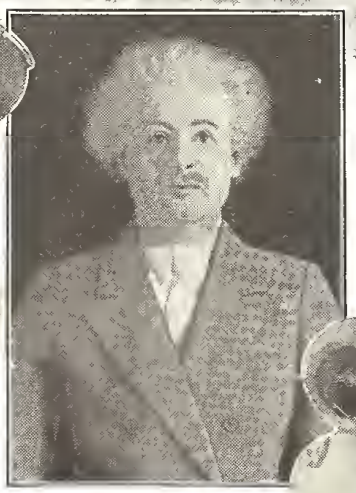
One thing is certain . . . there will be no more stolen oil taken from the Oklahoma City field. The methods of the men who stole more than 7,000,000 barrels of oil and thousands of dollars in taxes, many more in royalties and over two millions of dollars from producers, have been destroyed.

"Hot Oil" will be no more!

Wax Models of Celebrities



Mrs. Stubergh working on a bust of Einstein. She is here implanting real hair for eyebrows.



Here is Dr. Einstein, if not in the flesh, then in personality.



Glass eyes of exact color and size make for vividness in reproducing personality in wax. Mrs. Stubergh is making careful selection of eyes for model of Will Rogers, humorist.



Mounting a socket for the glass eye, using a hot iron to burn out the cavity. A delicate touch is required if the bust is to be a true likeness. Eyes are set in position from rear.

IF YOU are artistically inclined, have the master touch of the sculptor, enjoy playing with clay and wax, you can start a local hall of fame. All you need to know is the "how". The subjects, or objects, can be found in every village and farm, big city or county seat.

When you've worked up a fair-sized stock of busts or statues, you can charge admission to your wax museum and thus rake in a few extra shekels to help fatten your pocketbook.

Mrs. O. H. Stubergh of Hollywood, who has built up a lucrative wax model trade, gives a few tips on how to make the figures.

If you can't get the real life people to pose for you, she says, you can always utilize portrait photos. Working from these photos, you must first model clay busts, then from them make plaster of Paris moulds, into which you pour the wax to make the completed heads.

Glass eyes of just the right color must be set in the eye sockets, then real human hair is implanted upon the head and eyebrows with the aid of tiny needles which set two or three hairs at a time. Finally the delicate complexion is applied by a tiny spray gun and the coloring of lips and features added with an artist's brush.

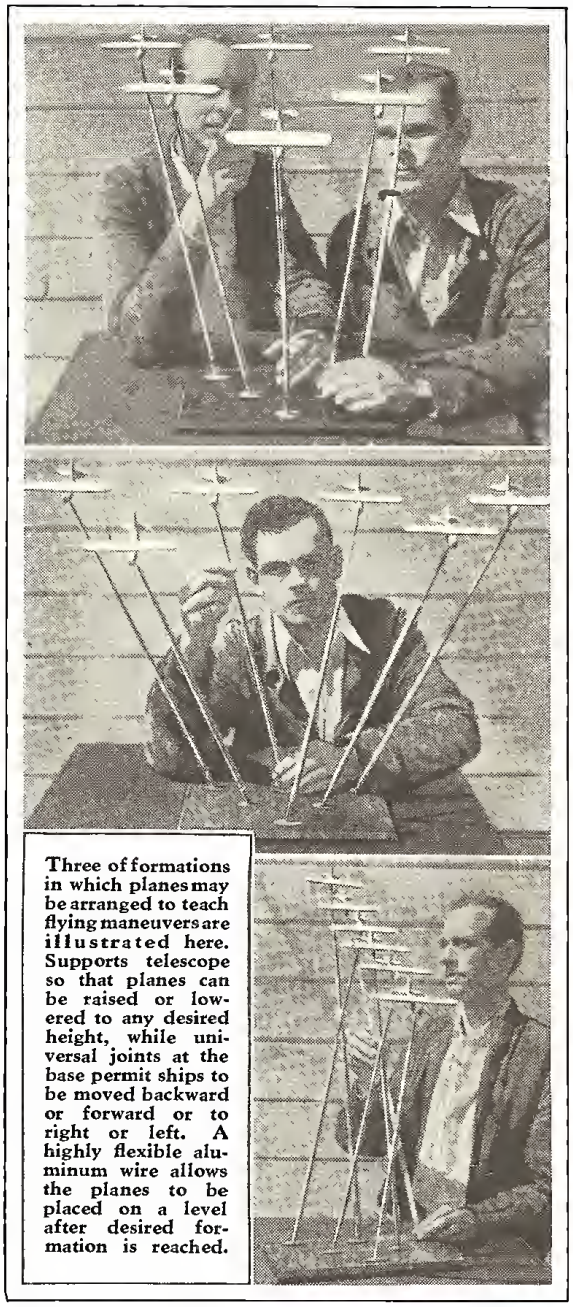
The figures and bodies are moulded from papier mache, and presto! if you are a good sculptor, the result is a production more life-like than the original.

This stunt has other money-making possibilities. "If people like photographs of themselves, how much more will they like little busts or statues," says Mrs. Stubergh. Human vanity will thus provide you with a market among people who would be willing to pay a neat sum for a bust.

The various steps described are illustrated in the photographs above. By way of attaining proficiency you obtain photos of movie stars and make models of them. After a little experience you will soon be master of the art.

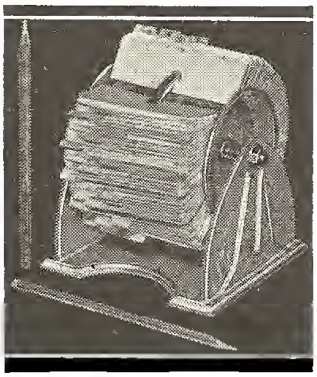
Adjustable Model Planes Help Teach Formation Flying

FLYING instructors teaching formation flying will find that students can get a clearer understanding of the lessons if they employ a novel device recently introduced. As shown at the right, the contrivance has six model planes mounted on telescopic supports which permit raising or lowering of the ships, while universal joints at the base allow the planes to be moved backward or forward, or to right or left. Connecting the planes to the supports is a flexible aluminum wire which levels the ships off after desired formation is attained.



Three of formations in which planes may be arranged to teach flying maneuvers are illustrated here. Supports telescope so that planes can be raised or lowered to any desired height, while universal joints at the base permit ships to be moved backward or forward or to right or left. A highly flexible aluminum wire allows the planes to be placed on a level after desired formation is reached.

Filing Cabinet on Wheels



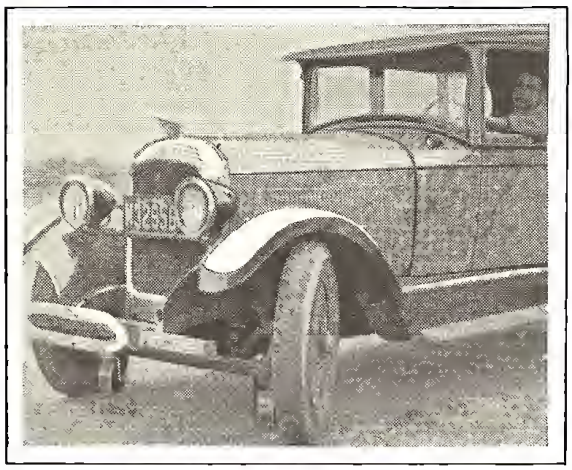
Cards are attached to central ring.

THE last word in filing convenience is offered in a new revolving card file recently placed on the market. Compact, time-saving, the file turns at a touch of the finger and displays 1000 cards attached to ring. Manufacturers claim the system is speedy.

Safety Wheels for Tire Blowouts

A PAIR of small wheels attached to the front axle of an automobile prevent the uneven dropping of the front end and keep the car on the road in case of a blow-out, manufacturers claim.

Each wheel is securely fastened to the front axle of the automobile just inside the front tires. With the tires inflated, the auxiliary wheels remain elevated about two inches above the road, but in case of a flat tire the car wheel drops only this distance, and the small wheels thus prevent the automobile from veering off the road.

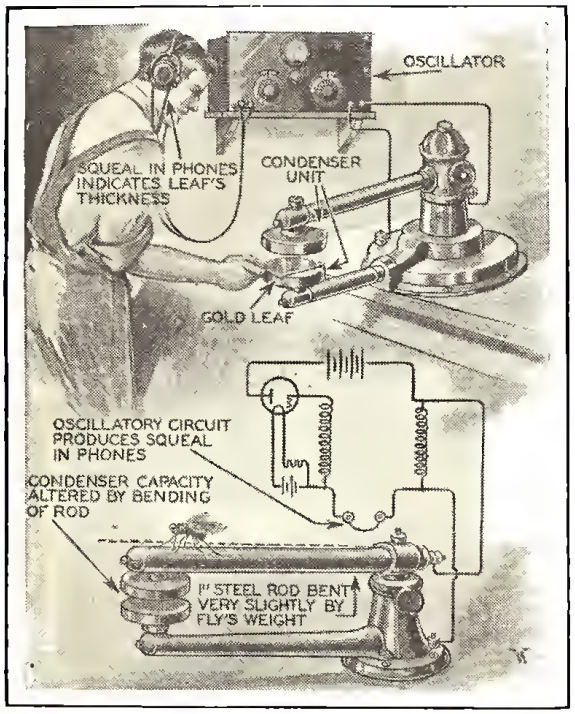


When tire blows out the car rides on small auxiliary wheels secured to axle, thus preventing loss of control and smash-up.

Moon's Relation to the Weather

MANY of the old folks believe that the moon controls the weather, but the truth is that the moon merely shows what is going on. Moonlight does not cause heavy frosts; but it does appear most brilliant in frosty weather. Another proverb has it that a ring around the moon indicates a storm, which is generally true because the ring or halo is due to reflection of moonlight from tiny ice crystals floating high in the air, and because those crystals are most likely to be formed just in advance of a cyclonic storm which is mixing warm and cold air high up in the atmosphere. Weather experts do not believe moon affects crops.

Vacuum Tube Device Measures One-billionth of an Inch



Drawing illustrates how extremely thin material such as gold leaf is measured by oscillator. Below, elements of circuit.

Body Poisons Self in Snake Bite

THEORIES of how snake venom kills human beings or other higher animals promise to be revolutionized by discoveries of an Italian biologist. It is known that snake venoms act in the human body by destroying the red corpuscles of the blood.

The Italian scientist finds, however, that the snake venom itself is not what dissolves the corpuscles. Instead, the poison acts first on an oily chemical called lecithin, believed to cover all cell membranes. This lecithin then splits into at least two simpler chemicals, one of which is what poisons the blood corpuscles. Thus the body cells themselves supply the material which kills and dissolves the corpuscles.

Nosepiece Aids Breathing in Cold



Hooked under nostrils, device keeps nasal passage open in cold.

HERE'S a new slant on curing colds in the head. It's a little adjustable hook which fastens to the nosepiece of your eyeglasses to lift up the nostrils and facilitate the passage of air through the nasal openings. How this extremely novel gadget is worn is illustrated in the photo at the left.

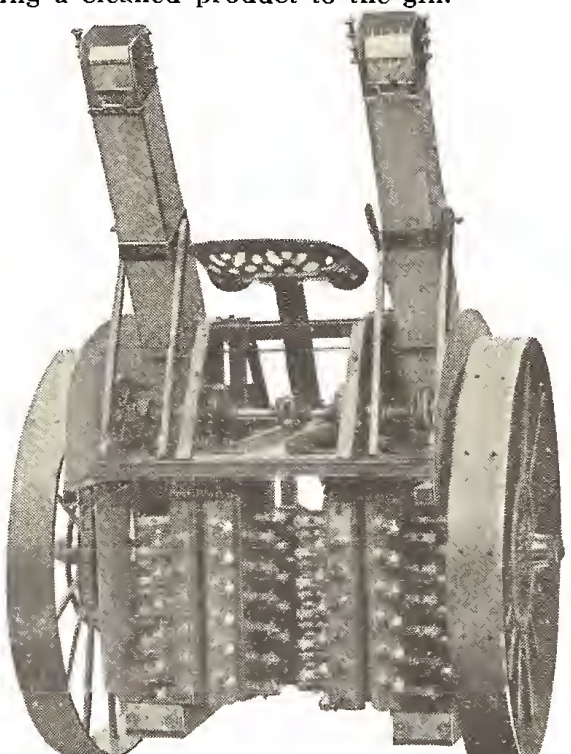
SOME indication of how crude our sense of feeling is may be had by comparing the human sense response with a new vacuum tube measuring instrument.

By devising a twin vacuum tube circuit which produces two slightly different frequencies, an English scientist has developed a measuring instrument of incredible accuracy. The twin circuits set up a beat note, which change in pitch when the object to be measured is placed between two ordinary metal plates, as illustrated in the accompanying drawing. The insertion of the object alters the capacity and thus changes the note.

By the use of this instrument distances as small as one one-billionth of an inch may be measured. How sensitive the instrument is is indicated by the fact it will tell the weight of a fly resting on a steel rod, measuring the infinitesimal deflection of the rod set up by the body of the insect.

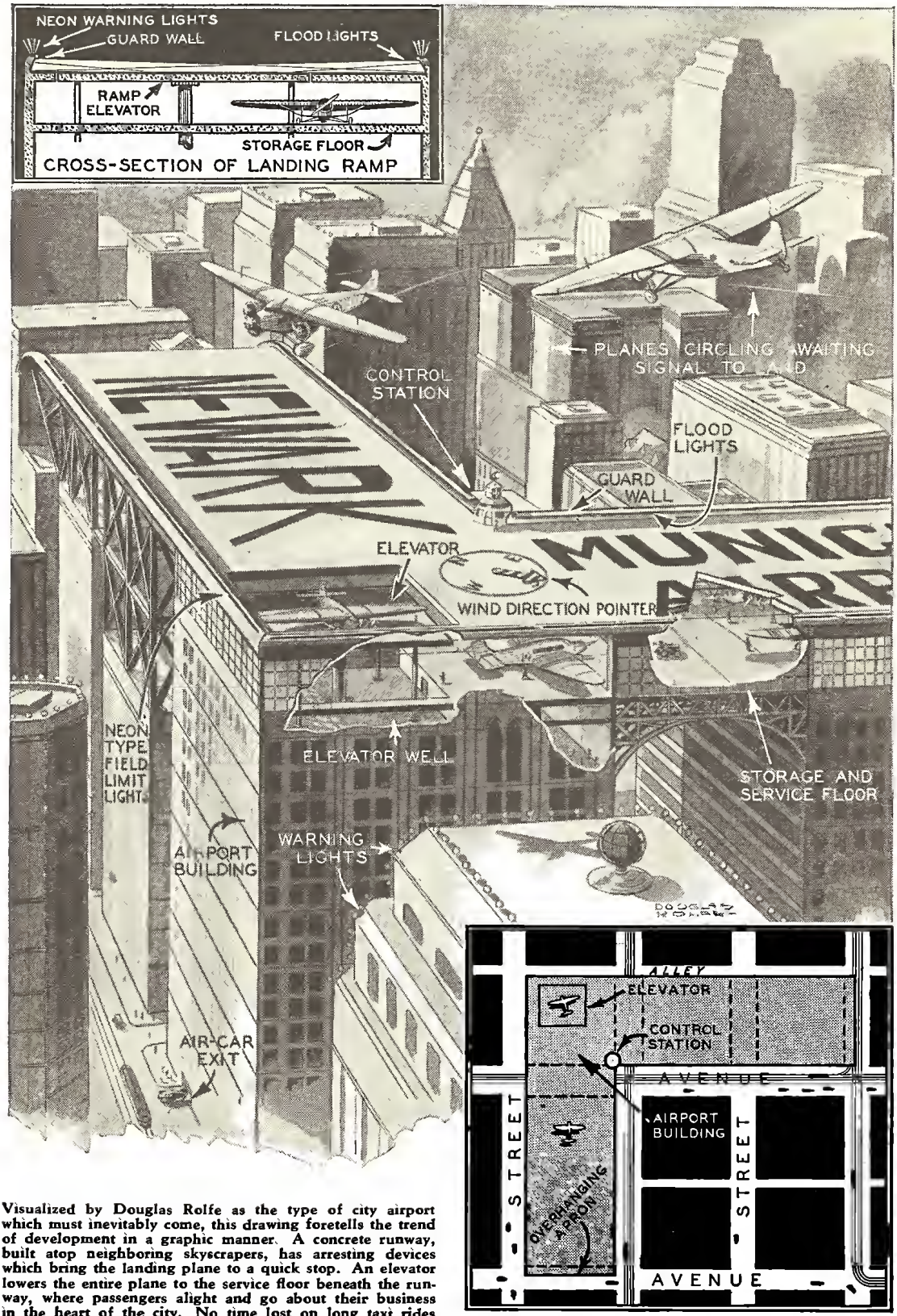
New High Speed Cotton Picker

THE problem of harvesting a cotton crop quickly and thoroughly is solved by the development of a new automatic cotton picking machine, inventors claim. The machine, shown below, passes down the rows of plants, extracting the fleecy staple by means of a battery of picker points which rotate so as to engage the opened cotton. Unopened buds are left untouched. When picked the cotton is dropped on a conveyor. The machine also removes all dirt, dried leaves and sticks, thus delivering a cleaned product to the gin.



As this high speed cotton picker passes down rows, rotating picker points engage the open cotton to remove fleecy staple.

Airport in the Heart of a City Provided by Logical Design



Visualized by Douglas Rolfe as the type of city airport which must inevitably come, this drawing foretells the trend of development in a graphic manner. A concrete runway, built atop neighboring skyscrapers, has arresting devices which bring the landing plane to a quick stop. An elevator lowers the entire plane to the service floor beneath the runway, where passengers alight and go about their business in the heart of the city. No time lost on long taxi rides from the present type of outlying airport.

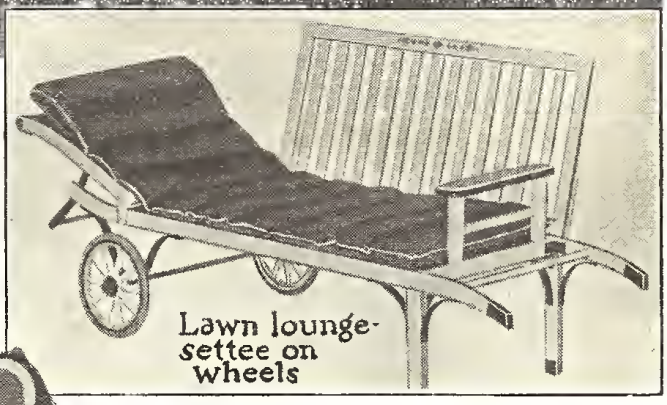
Here's cross-sectional view showing layout of city airport.

Mechanical Aids Remove



Cocoanut shredder

Fresh cocoanuts may be shredded with complete safety to hands by use of this new household utensil.



Lawn lounge-settee on wheels

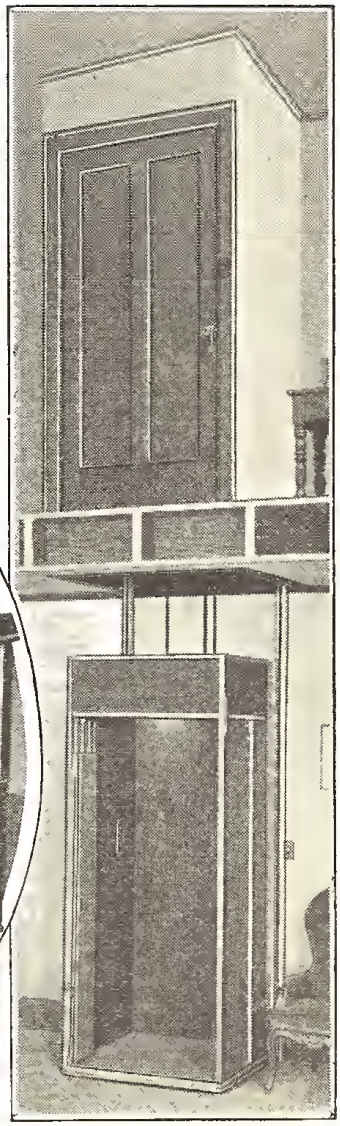
Combination lawn lounge and settee can be wheeled to any part of lawn or beach. Does duty also as convalescent chair.



Two legged card table

Ideal for the bed-ridden is this two-legged table, suitable for use as a card table, bed table, tilted book rest, etc. Legs are adjustable to bring top to any height and angle desired.

Home elevator



Last word in convenience is found in home elevator, adaptable to any house. Lifts 350 lbs., and has adequate safeguards. Operated and controlled by wall switch.

Drudgery from Housework

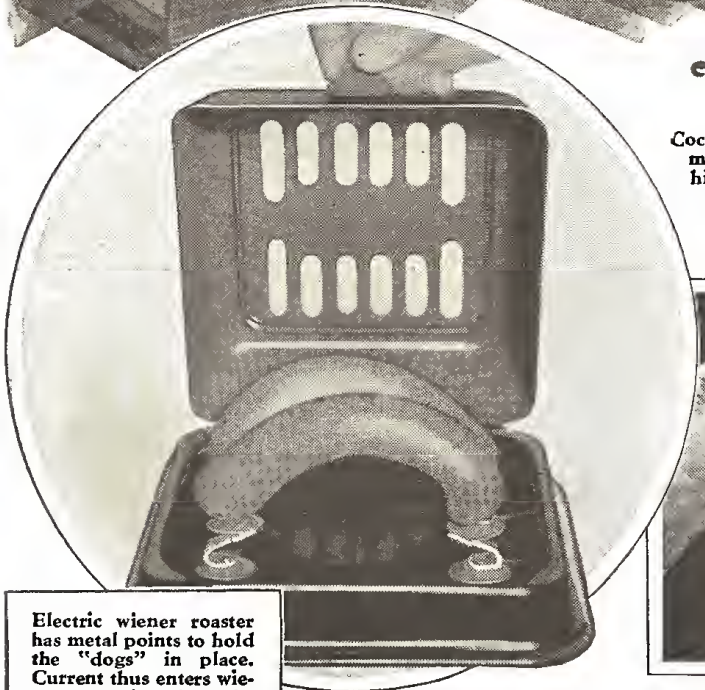


No longer is it necessary to waste energy to make trips to other parts of the house, office, factory, to talk to someone. This home intercommunicating system carries your voice clear and loud to party you wish to speak to. Adaptable to front door installation, as shown.

Home intercommunicating system

Insect exterminator

Cockroaches, ants, flies, mosquitoes, etc., have high mortality rate when in vicinity of this electric exterminator.



Electric wiener roaster has metal points to hold the "dogs" in place. Current thus enters wieners, roasting them deliciously in 60 seconds.

Electric weiner toaster



By pushing down on nipple of this new pump placed over milk bottle, cream is forced from the spout, leaving the milk undisturbed. Adjustable to take any amount of cream.

Plants Grow Evenly at High Speed in Electric Hotbed



Plants grow at high speed in electrically-heated hotbed.

THE growth of garden plants is thrown into high gear by a new type electrically heated hotbed recently developed in botanical laboratories. The acceleration is effected by the application of heat from an element strung on a frame beneath the bed as illustrated at the left.

The heat is thermostatically controlled, so that the plants are not subjected to the vagaries of temperature they would experience under outdoor conditions. The bed must, of course, be enclosed in glass, as in ordinary greenhouse. So far the scheme has proved suitable only for experimental purposes.

Something New in Midget Autos

MIDGET car builders will take keen interest in the Lilliputian motor car shown below. Powered by a storage battery, the vehicle dashes about the streets of Berlin to the amazement of spectators. The car was designed by a German engineer for his son, who is seen taking his girl friend for a ride. No plans on the machine are available.



Storage battery drives this unique midget car for youngsters.

How to Motorize Your Velocipede

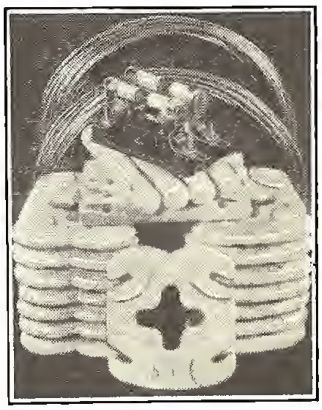
A MOTORIZED velocipede will bring heaps of fun to a youngster. How this "motorization" may be effected is illustrated in the photo at the right. As you will notice, a small drive pulley is secured to the spokes of the wheel. A small ⅛th h.p. electric motor is next attached to the rear braces and a leather belt passed over a pulley on its shaft and then over the large pulley on the wheel. Juice to turn the motor is conveyed over a long flexible cord, which limits the range of action, but allows sufficient freedom for a nice ride. The rider should start vehicle with a push of the foot.



Long cord to motor allows wide range of action for the rider.

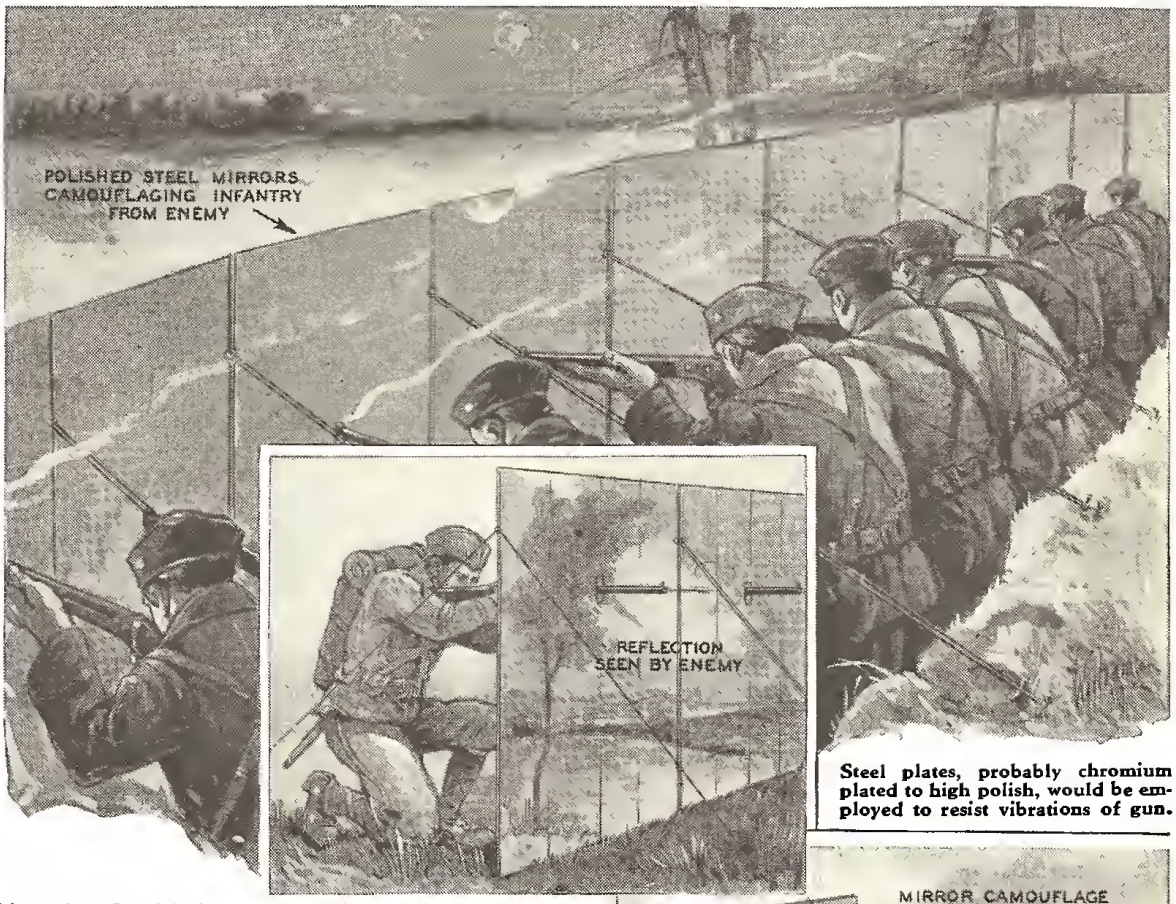
Doublet Antenna Brings in Europe

SHORT wave engineers have developed a doublet type of antenna which, it is claimed, makes foreign short wave broadcast reception possible thru interference from local stations and from man-made static. The antenna comes in kit form ready for erection, as shown at right.



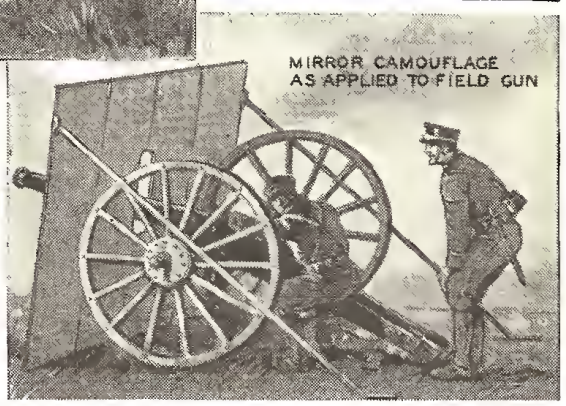
Long-range short-wave antenna, in kit form, ready for erection.

Spaniard's Mirror System Creates an "Invisible Army"



Idea of a Spanish inventor for the use of camouflage mirrors to confuse the enemy is shown above. The same principle, he claims, can be applied to field guns as at right.

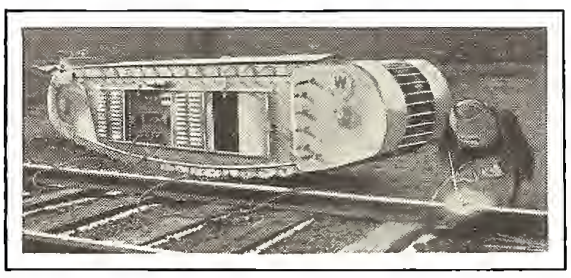
Steel plates, probably chromium plated to high polish, would be employed to resist vibrations of gun.



NOW comes the most astonishing of military ideas—that of rendering soldiers and artillery invisible by means of protecting mirrors which reflect the surrounding landscape back into the enemy's eyes!

Whether or not this idea would be according to Hoyle, in conformity with the hoary traditions of warfare handed down through generations, does not appear; conceivably it would be embarrassing to an army to find a serene landscape of clouds and fields popping away at it with machine guns and rifles—a sort of black magic not provided for in the drill book regulations.

Caterpillar Tractor Welder for Railroad Use Looks Like Fighting Tank



New welder, resembling army tank, eliminates need for long cables and does not interfere with right of way of trains.

IN APPEARANCE resembling very closely a present-day army tank, a new tractor welder has been designed to fill the need for a mobile power supply unit for use on railroad track jobs. It eliminates the need for long and expensive cables, can travel on the shoulder of the tracks instead of on the rails, and can climb slopes up to 45 degrees. Its principal use is for reclaiming battered rail ends, crossovers, switches, and other welding operations. It does not interfere with right of way of trains. It travels from one location to another on caterpillar treads, never using the tracks.

Home Beer Dispenser Keeps Foam Collar Under Control



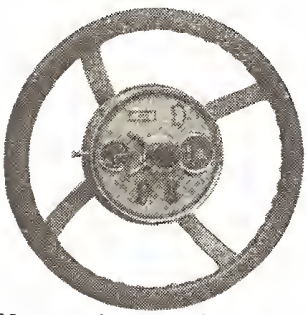
Ideal for the home, or for picnics and parties, is this "direct draft" beer pump which controls the foamy collar and dispenses the beer at the most enjoyable temperature.

AT LAST science has done something really worth while. This something is the introduction of a "direct draft" beer pump which, the inventors claim, eliminates "wild beer," controls the foamy collar, and delivers the so-called non-intoxicating fluid at the proper temperature.

Shown at the left, the pump attaches directly to the barrel, and is thus especially suitable for the home, or for picnics and parties, where it gives a professional air to the dispensing. The liquid feeds into a reservoir tank, and is drawn off into the drinking glass by the turn of a handle.

Dials, Controls on Steering Wheels

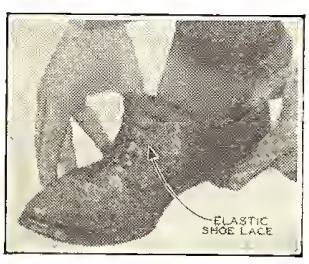
A NEW steering wheel for autos, planes and ships has mounted on it for the greater convenience of the operator the controlling elements and indicating instruments of the vehicle. The dials are visible under a panel of shatter-proof glass and directly lighted for night driving. Leads to the instruments pass up through a tubular pilot stem, to center within the steering wheel, as shown at left.



New panel mounts instruments in center of steering wheel.

Elastic Laces for Shoe Comfort

SHOES are worn with greater comfort when laced with a new elastic string now on the market. The shoe may be slipped on or off in a jiffy due to the elasticity of the strings, and their "give" makes a new shoe feel as easy-going as a pair of old carpet slippers. A slip catch regulates the lace tension for individual requirements.



Elastic lace "gives" when foot is inserted or removed from shoe.

Auto Wheels Transport Roller

DESIGNED especially for economic road maintenance, a new type portable roller moves rapidly from job to job on its own rubber tired wheels, effecting a great saving in time and labor.

When the new location is reached, the tongue is pushed up and over the roller. The eccentric axle construction then raises the wheels, bringing the roller surface in contact with the ground.

The roller can be transported with a truck or tractor or even with a roadster. It is equipped with a water tank and spray attachment and has a maximum pressure of 170 lbs. per contact inch of roller. Lighter sizes are available for smaller jobs.

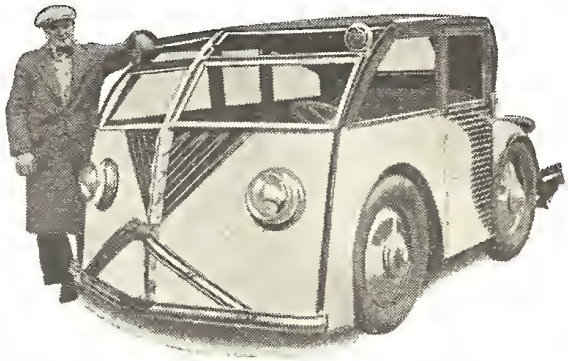


For transportation, tongue of new roller is turned up and over, bringing wheels on ground. Below—rolling position.

Inferior gold articles may be cleaned by coating first with fuming hydrochloric acid, and then brushed with Venna lime and petroleum. Finally clean and rinse in benzine and dry in sawdust.

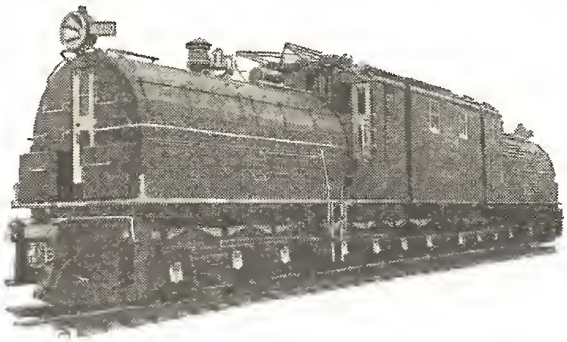
Ingenuity, $25 Worth of Junk Built This 40 M.P.H. Auto

A FEAT of automotive economy and craftsmanship has been performed by an ingenious Chicago man who built himself the unique bus shown in the photograph at the right. Using only parts picked up at bargain prices from auto junk yards and a few additional parts turned out in a home workshop, the youthful builder assembled his creation for a cost of only 25 dollars. The unconventional design of the car attracts attention everywhere it goes, but it renders dependable service despite its freakishness. The body is made from galvanized sheet metal, painted with startling colors. Speed of 40 m.p.h. is obtainable.



Freakish, but it really goes places. It's a home-built auto designed and constructed by a Chicago youth from junkyard materials at a total cost of only twenty-five dollars.

Fair to Display Mightiest Engine



World's mightiest electric engine—a 76-ft. locomotive powered by 12 motors turning individually the 12 main axles.

VISITORS to the Chicago Century of Progress Fair who go in seriously for mechanics in general and engines in particular will find much to interest them in one of the exhibits—the world's mightiest engine. This is an electric locomotive 76 feet long and is powered by 12 motors turning individually the 12 main axles. Dual controls are located in duplicate cabs at the middle of the engine to eliminate necessity of going on a turntable.

Eats Anything With Rubber Throat

A WOMAN who has lived most of her life with a rubber tube outside her chest to take the place of the esophagus is reported by the London correspondent of the American Medical Association. In the operation, the Adam's apple was removed and a rubber tube shunted around the missing section of the throat. As the woman swallows now, the food or drink passes from the closed throat out into the rubber tube and through this into the stomach.

Removable Back for Plane Fuselage

THE enclosed space within the fuselage of a well known monoplane is made accessible for rapid inspection or for package carrying through a removable back. This removable portion consists of that part of the fuselage extending from the rear cockpit to the tail and a short distance down on either side. Although the section is quite long it is not cumbersome and it can be taken off and replaced in a jiffy. For the airminded sportsman this compartment becomes a valuable storage space for miscellaneous equipment.



Vacant space in section of fuselage behind the cockpit is made accessible for inspection by removable back. For the air-minded sportsman or traveler this compartment becomes a valuable storage space for miscellaneous equipment.

CLOWN ALLEY

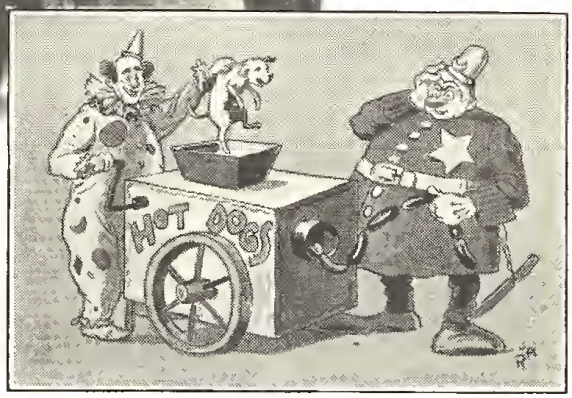
Stilts are an ancient but always effective piece of clown property. In the photo above is shown a stepladder effect graduating upward from a midget to a thirteen-footer.

BACK of the big top, in the men's dressing tent, is "Clown Alley," a peripatetic lane of trunks that have been set down in half the big vacant lots in the cities of North America.

Here, amidst a heterogeneous background of portable costume racks, grease-paint containers, clown motley, canvas chairs and painted buckets are the doctors of mirthology, answering a seemingly endless procession of cues; contributing their bit to the brilliant mosaic of the circus performance.

Here, in this bizarre setting of huge, varicolored trousers, flapping artificial feet, fiery wigs and ridiculous hats walk the ghosts of Jules Turnour, Al Miaco, Billy Wallet, Dan Costello, John Lowlow, Bill Gardner, Joe Pentland, Johnny Patterson and the inimitable Dan Rice whose name had a magic quality that transcended even Barnum's when our grandfathers were going to circuses.

But the "mechanics" of clowning have changed decidedly since the days of Dan Rice. He belonged to the old school of talking and singing clowns, any one of whom could monopolize the entire tent of the old one-ring shows. Today, the largest circuses present their buffoons in regiments and the ambassadors of glee must compete with virtually everything else the circus has to offer.



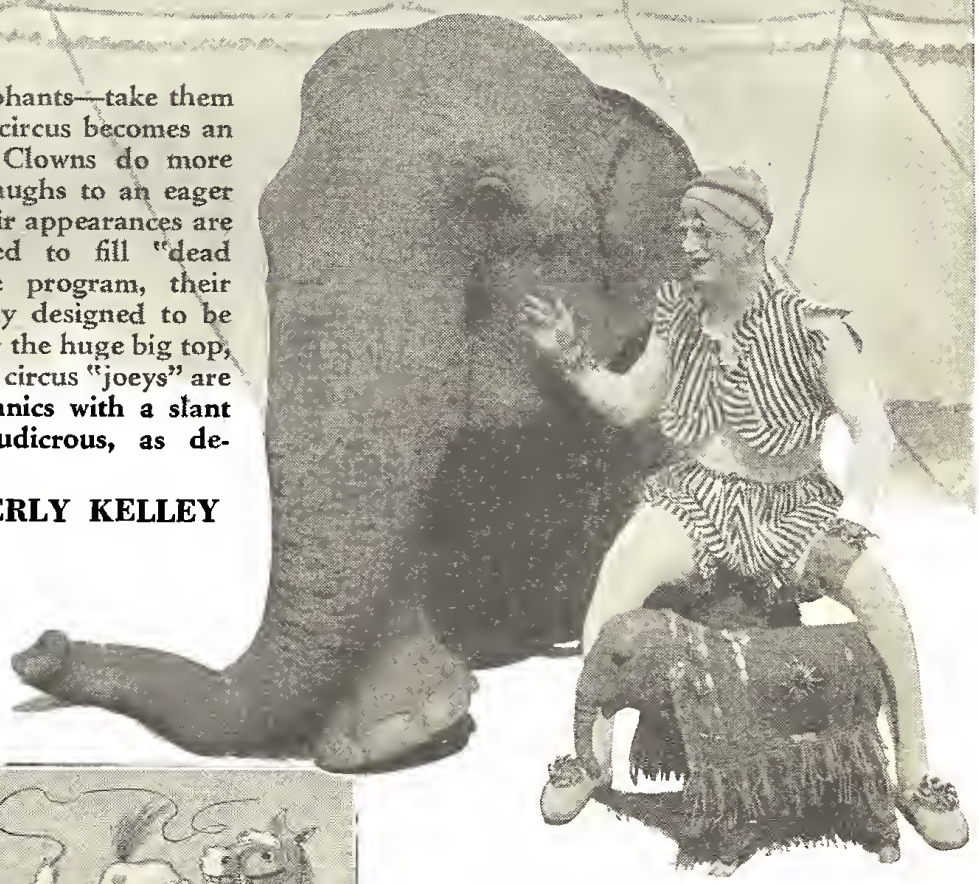
Every circus must have one or more clowns of an inventive turn of mind to produce mechanical fun-makers such as the well-known hot dog machine shown here, and others.

The art of the jester hasn't deteriorated with the advance of the times. Indeed, it has reached an even loftier level. Clowns of the present era must be able to make a swift, effective impression; get their laughs and retire gracefully. And have you noticed that a circus performance is a pretty fancy piece of mechanism? The time required to

LANE of LAUGHS

Clowns 'n elephants—take them away and the circus becomes an empty shell. Clowns do more than supply laughs to an eager audience. Their appearances are carefully timed to fill "dead spots" in the program, their stunts carefully designed to be effective under the huge big top, and altogether circus "joeys" are **creative mechanics with a slant toward the ludicrous, as described here**

by **F. BEVERLY KELLEY**



A sure-fire laugh-getter—a dog dressed up like an elephant. "Joey" is explaining to pouting Jumbo that it's all in fun.



"Trick" clowns, as distinguished from the mechanical type, ape the acts and mannerisms of fellow big-top actors or of well-known characters and depend on pantomime for effect.

run it off does not vary five minutes day after day.

Each time the equestrian director (or ringmaster) blows his whistle the entire panorama changes. A tent filled with animal acts will give way to a bevy of aerialists and the band will switch suddenly from gallop-time to waltz tempo. There seems to be no intermission, however brief, during the progress of the program. Why? Because of the clowns. They fill the so-called "dead spots" that occur between the moment one army of performers quits the arena and the moment another series of acts begins or while property men are setting the rigging for certain featured acts.

But to the spectator there is no "dead spot" in the procession of wonders, so adroitly are the clowns sandwiched between the seemingly endless layers of circus talent. There is a lot of psychology in the building of a good circus bill-of-fare. For example, clown numbers may be spotted to advantage right after some particularly hazardous aerial routine that has the crowd keyed up in an atmosphere of nervous suspense. The sudden appearance of the circus fun-makers at the conclusion of such an act allows the audience to relax.

A prevalent method of "filling in" is the clown "walk-around," which means that each stunt is repeated six or seven times as the mirth-provokers work their way around the hippodrome oval both singly and in groups. The singing and talking buffoons of our grandfathers' day would be lost and bewildered in the big top of America's biggest amusement enterprize with its seven rings and its eleven tons of canvas that



Notice that in this group of clowns no two have the same costume. Each man is protected by a sort of "moral copyright" on his own combination of paint makeup and dress.

stretches nearly six hundred feet from end to end. This main tent is so large that a clown will walk something like 150 miles in the course of a single circus season just doing his regular "walk-arounds."

Laughs that are born in Clown Alley live to a ripe old age. When George Washington attended Ricketts' Circus in Philadelphia one April day in 1793, there was a clown named McDonald to amuse the General. Perhaps he employed some of the same laugh-getting devices that amused you the last time you saw a circus. There seems to be an element of immortality threading through the best of the clown "gags." The art of the jester knows no temporal or geographical barriers. Laughter is a universal language and human nature hasn't changed appreciably in hundreds of years. Anything that ever was really funny is still funny.

Inventive Clowns

Fortunate is the clown who has his trunk in the Ringling-Barnum Circus "alley," for he can try out his new ideas on what he terms a "tip-off" audience when "Big Bertha," as the largest circus is termed by show people, gives its opening performances each spring at Madison Square Garden.

If this audience laughs loudly at the efforts of a clown, he can be pretty certain that audiences everywhere will respond in like manner whether the circus pitches its nomadic community in Chicago, Columbus, Philadelphia, New Orleans, Fort Worth, Denver or Los Angeles.

A clown act that gets a universal response is the one in which a clown places a lighted giant firecracker under a small table on which is mounted a colleague loudly torturing a trombone. Attached to the musician's trick trousers is an almost invisible wire. When the bomb explodes, the pants are jerked skyward, leaving the victim attired in violently pink underwear—and a trombone. So successful a laugh-producer is this "gag" when it is well presented that probably it can be used indefinitely—or at least as long as men wear pants.



Clowns, elephants, and feminine acrobats—here the three principal ingredients of the circus are gathered in one picture.

Just as New York City's Tin Pan Alley has kept the nation's feet tapping to the rhythm of its popular tunes, so Clown Alley has created the comedy that makes you forget your troubles when your youngsters give you an excuse to spend a few hours in the circus city of make-believe. Nearly all clown tricks are the result of long, careful planning during spare moments spent in Clown Alley between shows, aboard the circus trains during a long Sunday run or in the winter season when the big show is in winter quarters.

But a few good laugh-getters have been discovered quite by accident. One season when the Barnum & Bailey Circus had a sensational tank act, a clown accidentally fell into it while running around the ring. He came out dripping wet, his clown motley clinging to him, and looked so forlorn that the big top rocked with laughter. Thereafter the management paid him extra for falling into the tank at each performance.

On another occasion a clown devised a tramp bicycle act, but lacked an effective entrance. The night the show opened, however, he had a most fortunate mishap. The front wheel of his rickety machine caught as he was riding toward a group of clowns on the hippodrome track. He was tossed headlong over the handle bars, but managed to convert his fall into a somersault. When he landed, he solemnly shook hands with the other jesters and the spectators roared. He had found an effective entrance.



Maximo, the slack-wire clown, boasts an unusual collection of talents. His mimicry is carried out on the slack wire, giving it an added thrill of skill and danger—particularly when he acts the part of a drunken performer, as in the photo above, who has apparently wandered out on the rope with a bottle of stimulants still in his hand. Clowns, as at left, are part of the background picture of the circus, as well as actors in their own right.



Absurd exaggeration is the keynote of the clown's laugh appeal—as demonstrated by the tiny hat, the huge lines of the mouth, and the violently red nose.

Buffoonery even has its various classifications. Consider the "producing clown" with his intricate props and quick stunts some of which require half a dozen clowns in presentation. Ludicrous labor-saving devices such as the clown hair-cutting machine and the sausage-grinder—both time-honored "gags"—have been matched for originality by the deceptive bogus horse that appears to be walking on its hind legs while carrying a man on its back. In reality, the

Clowns Too Busy Creating New "Gags" to Waste Time on Broken Hearts





Back of the scenes there are no broken-hearted clowns, smiling through tears a la dramatic tradition. Off-hours are devoted to creating new "gags," like the fellow's at right. He pulls a cord and out pops a cuckoo from his derby.

clown is on stilts concealed in the padded hind legs of the "horse."

If a circus is to boast really clever clown material, it must employ at least one clown who is something of an inventive genius. Such a person is Buck Baker. He has been parking his trunk in the Ringling-Barnum Clown Alley for a good many years and each season he surprises his colleagues—and the customers—with a new invention. Baker made the tiny fire engines and he made the taxicab that falls apart after the fashion of the celebrated One Hoss Shay. Recently he built a miniature railroad train with a somersaulting coal tender. The train is large enough to carry the clown dwarfs.

Two Types of Buffoonery

Aside from the "producing clown" there is the "trick" buffoon. For almost every conventional circus act there are performers who burlesque the turn and usually the comedians are of necessity more talented than those whose work they ape. The best exponents of this school are Clarence Bruce, "Poodles" Hanneford and Orin Davenport, riding comedians; Walter Guice and the Bob-Eugene troupes of high-bar artists; Maximo, the clown on the slack-wire, and the Nelson Brothers who do their amazing acrobatic routine while mounted on stilts. Hanneford learned that it is virtually impossible to discover anything entirely new in circus acts when he once tried to copyright his comedy bareback riding act against a host of imitators. "Poodles" thought he had originated an entirely new routine, but it developed that it simply was a variation of an ancient riding act called "The Tailor's Ride to Brentford" or "Billy Buttons"—even to the pulling off of the horse's false tail, a feature of the Hanneford act.

European and American clowning differs widely. Most of the shows abroad are one-ring affairs that still provide a setting for the talking and singing clown. Even when the buffoons of European circuses are restricted to pantomime they are permitted three times as many minutes as a big American circus would allow for clown work.

All circus clowns get their sobriquet from Joseph Grimaldi, famous English clown about whom Charles Dickens and his father wrote a book and in whose honor jesters today are nicknamed "Joeys."

Circus lovers frequently ask where the clowns come from and what becomes of them after they quit the circus. Among the laughter brigades of the big shows there are joeys of many nationalities and in the veins of some of them runs circus blood that dates back many generations. In contrast, there are the young recruits to the Legion of Laughs—some of them college graduates. There is the story of Jerry Bangs who graduated from the New England Conservatory of Music, but had to seek employment out-of-doors to improve his health. Jerry killed two birds with one missile by becoming a clown with The Greatest Show on Earth where he soon regained his health and satisfied a life-long ambition to be a clown.

Clowns, taken collectively, are a happy lot and the "alley" isn't strewn with broken hearts despite the popular belief that the

(Continued on page 119)

Match Stick "Pictures" Latest Parlor Fad

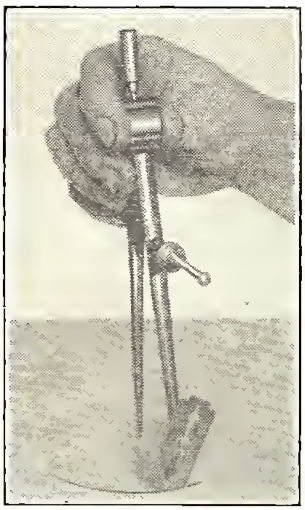


Three match stick pictures, two of horses in the pasture and one of skiers on a mountainside, which are self explanatory. Note the whimsical effects secured with ordinary matches by a few strokes of the knife.

A NEW fad for the artistically inclincd is the creation of three-dimensional pictures from match sticks. Offhand it would seem that the opportunities for evolving anything of artistic merit out of these materials were extremely limited, but, as the photographs above prove, some of the productions are whimsical in the extreme.

Match sticks, to begin with, are made of soft wood of excellcnt quality which lends itself well to manipulation with a knife. A close study of the match stick horses reproduced abovc will show that the artist has created legs, tails, etc., with the utmost economy of line.

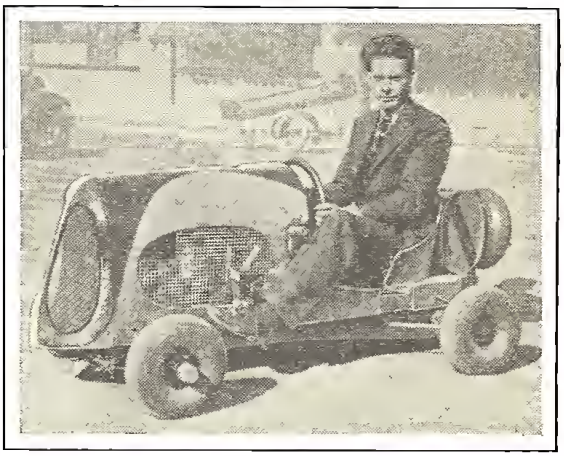
Cutting Circles With Razor Blade



WHENEVER a quantity of perfect circles are required to be cut out of paper, thc usual process is to draw them with a compass and cut around the lines laboriously with scissors. Butwhen a great number of circles are required, as is frequently the case when they are being used for decorations, etc., this tedious method is exhausting and unnecessary. Sesure an ordinary compass and fasten a safety razor blade to one leg with a drop of solder, tilted at a slight angle to present a cutting edge, as shown in the photograph. In practice it will bc found that one blade will cut as many as 50 discs before becoming too dulled for further service.

Mile-a-Minute Midget Car

ALTHOUGH it is constructed entirely of spare parts of automobilcs, motorcycles, and airplanes, the midget car shown bclow, built by Tom Donaldson of Hapeville, Georgia, can burn up the highways at mile-a-minute speed. Air wheels salvaged from a damaged plane supply the rolling stock, while the engine is from a motorcycle, which explains the cooling screenwork.



Motorcycle and airplane parts went into this midget car.

1000 WAYS to MAKE a



Wipe Your Troubles Away

A sedan stops when the traffic light changes from green to red. A man steps out from a curb, whips out a clean wet rag and wipes the dust from the windshield, following it up with a chamois. He wipes off the two headlights and finishes up the windshield job on the driver's side. Around his neck hangs a placard reading: "A nickel buys a day-old loaf for the kid" or "If you can spare a coin, thanks—it will circulate!" Just as the traffic light changes his cleaning job is completed, the driver has time to read the sign and reach for a coin. This will net from $1.50 to $5 a day by actual test. A good-natured grin will help to soothe the ruffled ones.

Be an Alarm Clock

Here is a simple way to make money that will appeal particularly to shut-ins. All that is required is a telephone and an ability to rise early. A resourceful invalid who, through contacts with office-working friends, became aware of the number of workers who are late on the job every day through failure to get up in time, mailed the following notice to a selected list: "Are you late for work? This can easily be remedied. For ... cents a week I will call your phone number at any hour you wish. Just fill in the enclosed blank and phone number and I will call you every day." The number of people who accepted her offer surprised her. Many people go back to sleep after shutting off an alarm clock, which they will hardly do if they get out of bed to answer the telephone.

Profits From Waste

Waste materials which constantly accumulate around photo shops can be converted into money. One unemployed man signed up all the shops in his city, offering to take away all waste hypo and scrap sensitized materials at regular intervals. A Ford truck was used in which hypo was carried away in barrels, papers in large sacks. Silver in the hypo was recovered by suspending sacks of granulated zinc in the solution, silver being precipitated as a gray sludge. Clear liquid was drained off and the sludge allowed to dry, after which it was scraped out of the containers and shipped to the refinery. Papers were burned and the ashes shipped in separate packages.

Summer Hotel for Pets

For those who live in a fair-sized community, this idea is quite practical. Watch the daily papers for items on people who are leaving town for vacations. Phone them, asking if they have pets, stating that you take care of them in a "hotel" at reasonable rates while their owners are absent. A small ad also brings results. Pets should be called for and delivered. Charges are made by the day, week or month; usually at the rate of 50 cents per day, $2.50 per week, or $8 per month. This, of course, includes all costs of feeding and housing the animals.

Mechanical Drawings for Lawyers

Lawyers trying accident cases depend a great deal upon photographs to present their evidence convincingly. Photos, however, cannot show true dimensions in all instances because of perspective. One mechanical draftsman has worked up a profitable trade among lawyers, taking his drawing board, steel measuring tape, etc., to the scene of the accident and making an accurate drawing of the surroundings. His method of selling his service to begin with was to make a drawing of an important intersection, carefully done, and then to present his service in person to lawyers handling this type of case. As his abilities became known, assignments came to him in such numbers as to keep him occupied full-time. Fast service and perfect accuracy is demanded in this work. The only equipment required is ordinary drafting tools and a portable drawing board.

Rental of Household Equipment

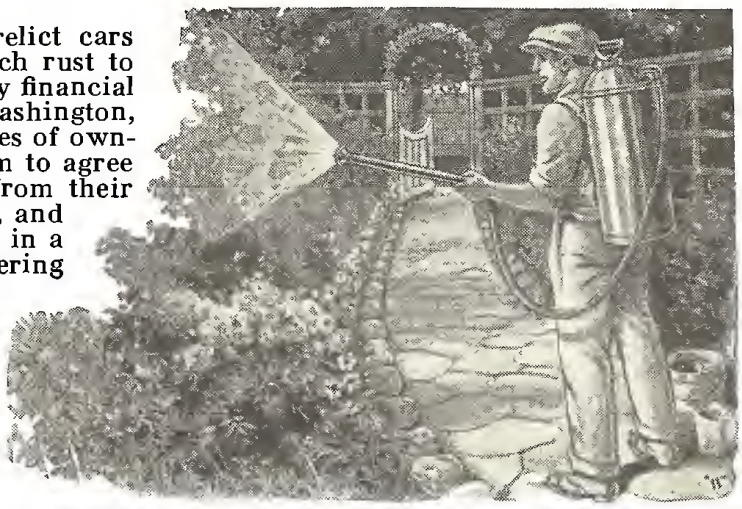
A housewife makes money by renting her electric vacuum sweeper, floor waxer, and other pieces of equipment by the hour to other women who do not own such items. These women find it cheaper to rent equipment as it is needed than to hire help. Practically all the income that this woman derives is clear profit, except for the cost of a small ad in her local paper which helped to get her business started. She finds that the business which develops just in her own neighborhood is sufficient to keep her equipment busy.

LIVING

Another installment of ideas which youths, men and women have used successfully to earn a livelihood.

Old Cars—Cold Cash

Hundreds of people have derelict cars cluttering their back yards which rust to pieces without their deriving any financial benefit therefrom. A Tacoma, Washington, mechanic got in touch with scores of owners to junk automobiles, got them to agree that they would remove parts from their cars as the mechanic sold them, and then he listed all available parts in a circular which he sent out answering responses to his ads. Garages he found promising prospects, all of them requiring odd parts from time to time. In this way both the mechanic and the owner of the car made money, and since the mechanic left the junked cars where they stood, he had very little overhead.



Renting Flags for Holidays

A grade school pupil makes seasonal money renting flags for holidays. He started with a dozen medium-sized flags and rented them out at 25 cents each for the occasion, this cost including the hanging in strict accordance with Army regulations. From time to time he obtained more flags and now has a great many customers on a yearly service basis, specifying on which days flags are to be hung. When a holiday arrives he is up early making the rounds. Where no pole is supplied by the owner, the flag is hung from two screw-eyes.

Cactus for Profit

An elderly St. Louis man who lost his business was strolling the streets discouraged one day when he passed a florist's window and noticed cactus plants displayed at a high price. Recalling how cactus grew wild in his native Texas, he struck a deal with several florists to supply them with the plants. Now four trips a year to secure a truck full of cactus provides enough revenue to keep him and his wife in comfort. The local market for cactus plants can be gauged by talking the matter over with florists in your community.

CASH FOR MONEY-MAKING IDEAS!

Have you worked out some ingenious, practical way of making money, either as a full-time job or a spare time activity? Perhaps some friend or neighbor, thrown out of work, has used his wits to devise some money-making scheme which brings better returns than the job he lost—this very thing has happened so often recently that many men look on depression as a blessing in disguise. For all accounts used in this money-making department of the magazine, payment will be made at regular rates. Contributions will not be returned unless postage is enclosed. Keep your article brief, and address it to Modern Mechanix and Inventions, 529 S. Seventh Street, Minneapolis, Minn.

Spraying Shrubs of Homes

A young man employed by a nursery recently found himself out of a job. He rigged up a portable spraying outfit for carrying on his back and drummed up a good business in the residential district of his city. First he called on his prospect and gave a bid on the work after inspecting the trees and shrubs. All necessary sprays he carried with him so that he could cover an entire yard in less than an hour. The best way to get customers was to show them actual damage done by pests. He would pick a leaf off a "buggy" rose bush and show it to the owner, telling what spray he would recommend and his price for ridding the garden of the bug.

Replacing Headlight Bulbs

Noticing that one car out of 40 had either a headlight or tail-light bulb dark, a young Los Angeles man got himself a motorcycle, stocked it with bulbs and screwdriver, and stationed himself at a busy boulevard intersection. Whenever he saw a "one-eyed" car he chugged in pursuit and drew alongside. The motorist, at first fearing that he was a traffic officer, was pleasantly surprised to find that it was only a pleasant-faced fellow in a mechanic's suit offering to fix up his light for 50 cents on the spot and thus avoid possible arrest by officers further on.

Aquarium Pets

Selling salamanders, young turtles, small frogs, etc., at five cents apiece to pet shops selling aquarium supplies, one youth found it easy to dispose profitably of all such pets, as he could catch them from the many stagnant ponds which existed near his home.

If you are unfamiliar with aquarium pets, look them over in a local store—most tencent and department stores handle them. Further data can be obtained from books on zoology.



Grasshoppers Pay an Income

The thousands of grasshoppers which you see jumping around the fields on hot summer days will yield you a nice income if you gather them up and sell them to your fishermen friends for bait. A man in Los Angeles, who has acquired the title of the "Grasshopper King," harvests these pests in the infested areas of the West with an ingenious trap, bottles them up, 200 to the bottle, and markets them among trout fishermen. You will find it profitable to establish little bait stands in fishing regions and tell the world about your product with a large sign on the front. If there's an Izaak Walton League in your town get in touch with the members—they will make your most promising prospects.

Compiling a Community Directory

Very few cities under 8,000 have a city directory. One young man in a middle-western city took advantage of this situation, compiled and published a directory, and made a sizeable profit from the job. He first got an estimate price on a book from a printer, then made a survey to determine the number of possible purchasers, and learn if he could make a profit. After enough advance orders were secured to defray printing costs and assure a small profit, he made a complete survey of the community, secured all necessary information, and prepared the book for the printer, using a regular city directory as a model. When the directories were completed, they were distributed at a nominal price to every business man in the city.

Conducting Shopping Tours

A young Indiana married woman with a pleasing personality and desire to increase the family income found surprising profits in conducting personal shopping tours for elderly people. She worked up a clientele over the telephone and through newspaper ads. Then, appropriating friend husband's automobile, she called on her customers, drove them to the shopping district, and assisted them through the crowded streets and stores, offering purchasing suggestions en route. Afterwards packages and customer were delivered safely home. Her charge was a flat rate for long tours, and an hourly rate for the short ones. Generous tips for polite service added to her revenue.

Money in Free Stationery

Furnishing free stationery to hospitals, clubs and similar institutions is the way an enterprising cripple earns a sizeable depression income. Space advertising is solicited, generally from firms with which the institution deals, the ads appearing in individual spaces on the outside and inside of the cover of the pad. $10 is considered as a fair price for an ad, but this, along with your profits, is determined by the quantity and quality of the stationery decided upon by the club or hospital authorities and the "salesmen." The pads and stationery are placed in the hospitals for the patients and in clubrooms for the members.

Mail Collecting Service

Knowing that Uncle Sam's rigid mail schedules work hardships on rural citizens, an Austin, Texas, youth with a motorcycle instituted a mail collection service whereby his subscribers can get their letters and packages off on the last train when they have missed the regular collection. He built for each customer a small wooden box with two compartments, one for mail, the other for the nickel he charges for the collection. Late at night, just before the last mail train arrives, he makes the rounds on his motorbike gathering up rush letters and packages—and the nickels. This service saves his customers the trouble of scurrying a long distance to the postoffice, and nets him a neat daily profit. Of course, some arrangements have to be worked out with the postmaster.

Making Store Sign Holders

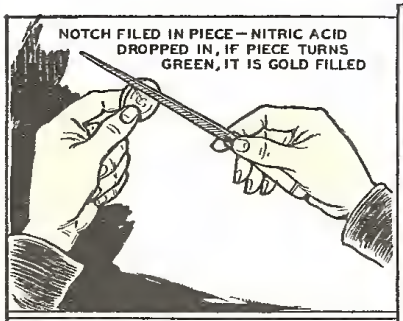
Twelve dollars for 15 hours work was the profit netted as a starter by a Chicago man who turned out in his workshop a novel type of sign holder for store windows. The holder is simply a suction cup with a wire or brass strip clamp bolted to the tip. The signs are painted on cardboard and slipped into the clamps, saving the necessity of smearing the windows with white wash lettering unsightly in appearance and difficult to remove. Double clamps for larger signs may be made by joining the two bolts with a brass strip. $1 at any hardware store will purchase a hundred cups of 1 3/16 in. dia. size. Grocers, hardware dealers, etc., will gladly pay you 15 cents for a single-cup holder and 25 cents for a double cup holder, and you'll find the selling end a lot more pleasant than a house-to-house canvass job.

Rattlesnakes Bring Profits

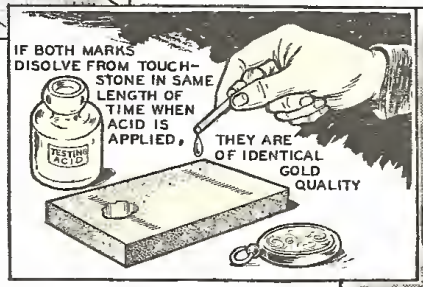
Selling rattlesnakes captured in the Sierras is the way a Los Angeles man earns

(Continued on page 27)

Gold Recovered From Old Jewelry, Sold to U. S. Mint Brings Big Profits



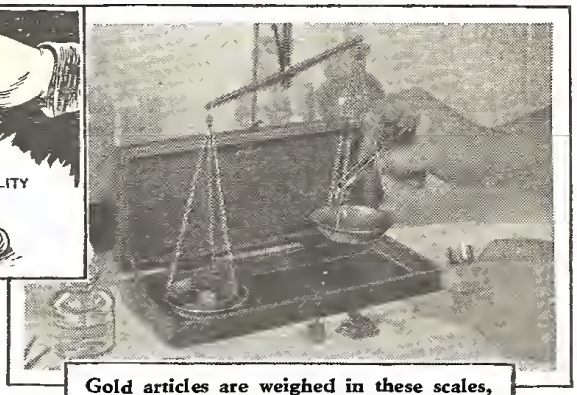




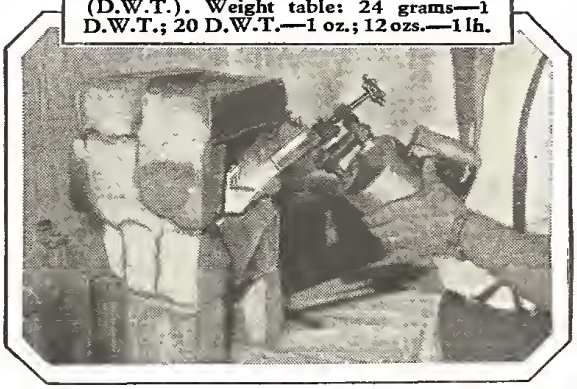
Three reliable tests for gold. To test for solid gold file as shown in top drawing. No reaction indicates solid gold. Center, gold needle and touchstone test, testing equipment being available through jewelry supply houses. Right, the acid test made by scratching marks on touchstone.



Gold buyer is here seen making test with gold needle set and touchstone. Using small portion of his garage for a laboratory, he makes a good living.



Gold articles are weighed in these scales, the weights being in units of penny-weight (D.W.T.). Weight table: 24 grams—1 D.W.T.; 20 D.W.T.—1 oz.; 12 ozs.—1 lb.



The furnace, heated with a blow torch, is built up of brick, coated inside and out with fire-clay, and lined with Hytempite Refractory lining, obtainable at chemical supply house.

IT IS safe to say there is a fortune in old gold in every sizeable town in the country waiting to be turned into cash by the process of reclamation. As we all know, there is a steady demand for gold, and the valuation for 24K fine gold is $20.67 per ounce. (Value at May 1, 1933.)

The process of reclaiming gold is comparatively simple and does not require an extensive knowledge of chemistry or elaborate equipment. Jewelry, no longer used because it is out of style, discarded watch cases, unused spectacle frames, dental plates and crowns, are only a few of the sources of old gold. The best methods of obtaining this old gold are by inserting ads in your local paper and soliciting house to house.

The way to make the biggest profits is to buy the gold, melt it down and extract the pure gold from the alloy, after which it is sent to the U. S. mint for the cash value of pure gold.

The first step in the process is to know how to buy and what to pay for the gold-bearing articles. The complete equipment required here is shown in the photographs. The scales are used to weigh the article, the weights being in units of penny-weight (hereafter abbreviated—D.W.T.). Gold is measured by Troy weight as follows: 24 grams: 1 D.W.T.; 20 D.W.T.: 1 oz.; 12 oz.: 1 pound.

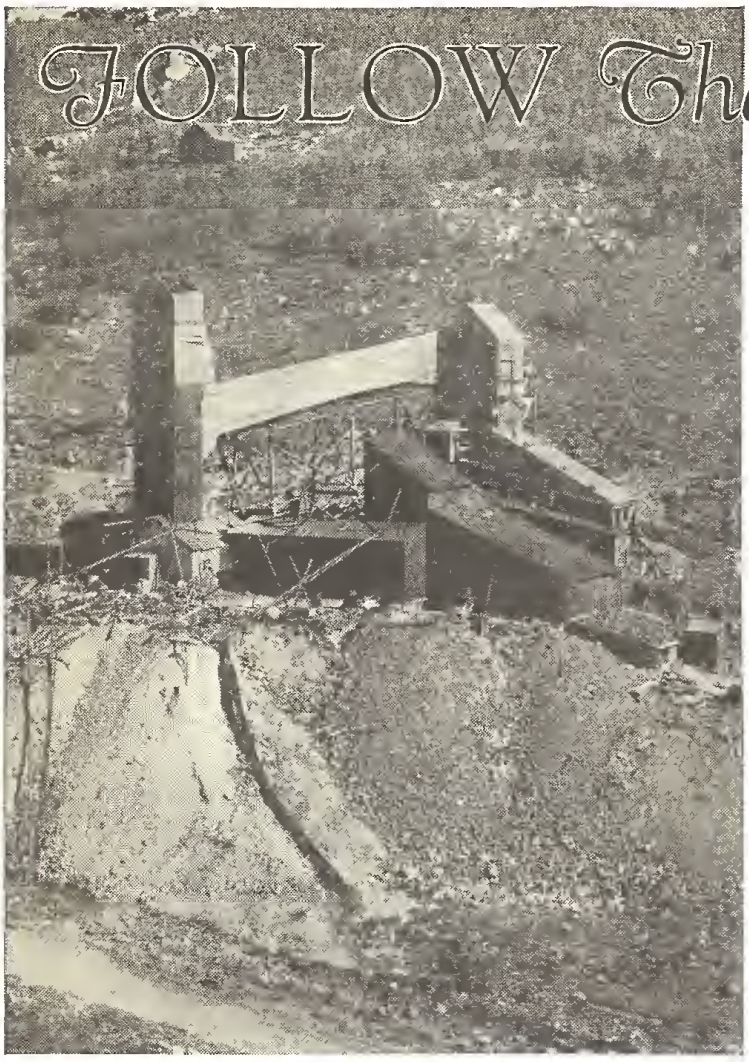
The metal is then tested as to whether it is solid gold or gold filled by filing a notch into the sample with a triangular file, as illustrated in an accompanying drawing. Put a drop of chemically pure (c. p.) nitric acid into the notch and if there is a green reaction, the article is gold filled. No reaction indicates solid gold.

The article is usually stated by the owner or marked to have a certain carat quality. To test this we use the jeweler's touchstone,

(Continued on page 28)

FOLLOW That GOLD

In this, the final installment of the series of articles on how present-day prospectors get gold out of the hills, which began in the April issue of Modern Mechanix and Inventions, Mr. Carhart tells how to locate lodes from which placer gold originates and describes machinery which enables deposits of low-grade ore to be worked profitably.



A typical small gold mine in Colorado, showing the type of working which the prospector who strikes a small vein of fair grade ore can expect to establish on a profit-paying basis. Ore also can be hauled to a mill.

EVERY particle of placer gold comes from the weathering of an outcropping vein somewhere up stream.

The vein may be beside the creek, or high on a cliff. It may be masked by talus, or it may be in plain sight. It may be wide or narrow, rich or poor, but somewhere, up-valley, where gravity carries it to the stream, and the stream then washes it down the channel, is a vein of gold ore.

A miner who limits himself to placers exclusively, because of low cost in production, may be barring himself from a fortune. Placer gold is diluted with every sort of materials from every slope in the drainage basin. Therefore, if there is sufficient gold coming from the vein to show in this diluted form, the gold in the vein must be fairly rich.

The locating of the lode from which placer gold originates is the next logical step for any miner who is out to find gold regardless of where it may be located and in what form it is found. Even a placer that shows scant gold values may be getting that gold from a vein that is rich. Or, as in the case of many gulches, the old timers have worked out all coarse placer gold, until there is nothing left except the finer gold. Often these pioneers stripped the placers, then hurried on to other easy gold; or they hunted for and missed the vein from which placer gold originated.

If there are a number of existing mines up canyon this may indicate that the veins, that have been cut out by the stream in the canyon, have been located. It does not positively prove that all of them are located. But a gulch showing a trace of gold and no mines above may have been stripped of its heavier gold, and there may still be undiscovered veins at the head of such a gulch waiting for modern prospectors.

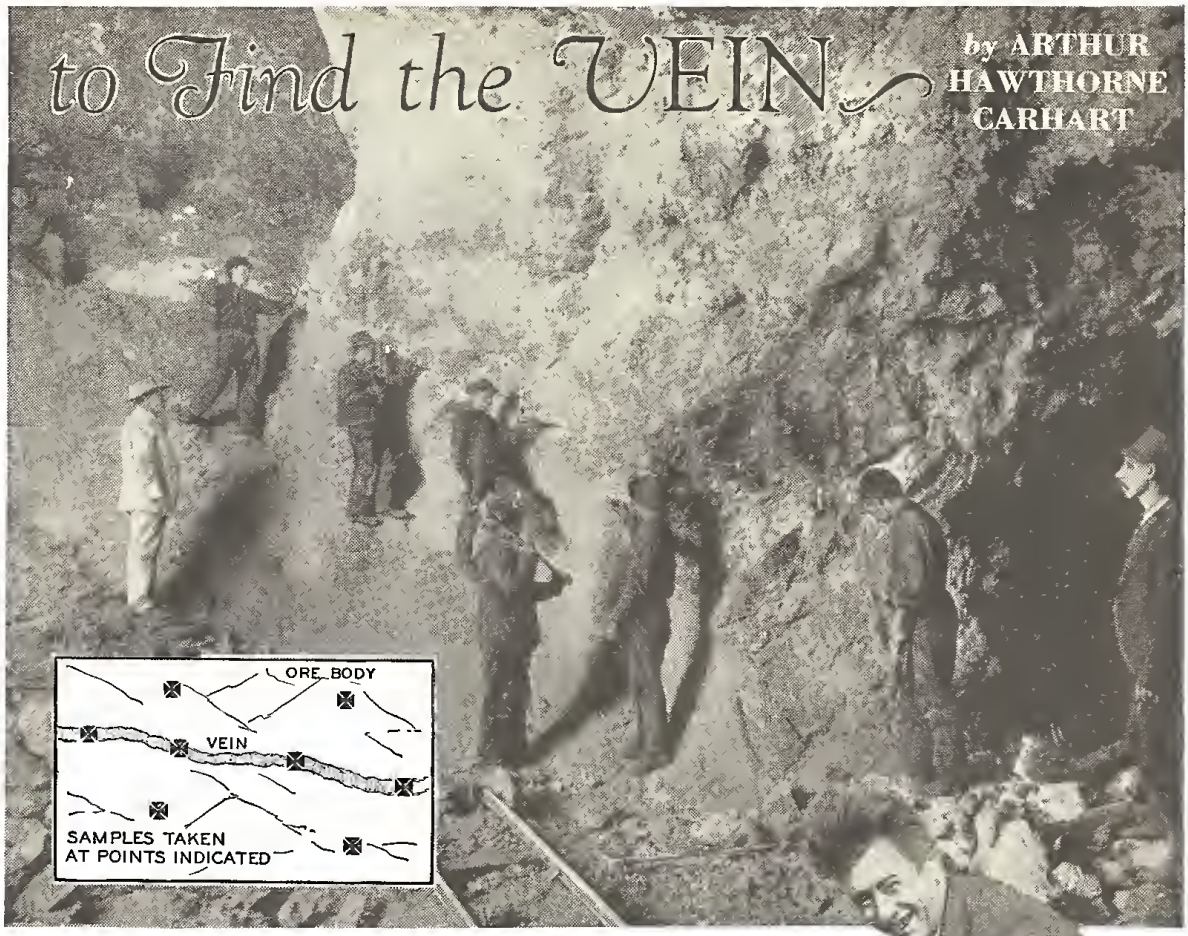
By panning up stream at regular intervals the prospector finds that at some point gold ceases to appear in the pan. Or he may be finding two kinds of gold at first, one rough showing it has not been water-carried any great distance, the other flat, smooth particles indicating they have been washed from distant sources. Then the rough gold ceases to appear. By panning back and forth just below that point, the approximate point of entry of that rough gold may be located. The next step is systematic sampling and searching of the slopes until the streak of gold-bearing talus is found. Above that will be the outcropping.

Hard rock miners will tell you to be on the lookout for quartz. It is not positive evidence of gold-bearing rock but it is an indication. Sometimes pannings in the stream will wash out bits of quartz flecked with free gold. In that case look for a gold-bearing quartz vein.

It is an axiom of miners that where there

to Find the VEIN

by ARTHUR HAWTHORNE CARHART



Miners working a gold ore vein after the main body of ore has been exhausted. When you have located your vein, take samples right in it, as indicated in the diagram, and also a few at right angles to the main vein to check on how far gold values extend out. An assay of the samples will tell you where you stand on a dollars-and-cents basis.

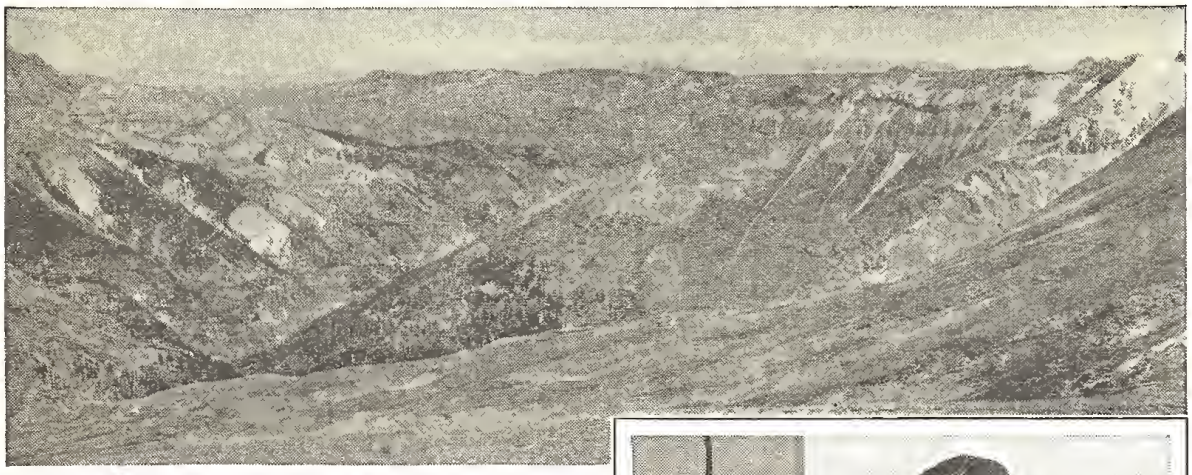
is placer gold in the sands of a stream, that gold comes from a formation in which gold is not in intricate combination with other minerals. If you find quartz shot through with native gold, no expert will be needed to prove to you that you've found it. But sometimes when gold is in combination with other minerals, it is hidden. So do not quit until you have proven the outcrop. Get an assay. They cost about fifty cents. If they uncover hidden gold they are worth many times their cost; if they prove you have worthless property, they save you days of useless work.

Locate your vein. Take samples right in it. An average of these should give you a measure of its richness. Sometimes it is desirable to take a sample or two out at right angles to the main vein to check how far gold values extend out. Such sampling may uncover considerable deposits of medium or low grade ore. But spend enough time and the little money necessary to prove the prospect.

If the assays show that you have found only low grade ore but in a quantity, it may be a milling proposition, requiring capital. In that case you would prove its extent and values by adequate testing, then interest



H. M. Gregory is one of our readers who is going after gold this summer with a hydraulic outfit, shown above, built of Model T Ford parts. The nozzle is made from the drive shaft housing of a Ford ton truck. He expects his outfit to move 20 to 30 cubic yards per day. Water pressure at 100 pounds will shoot a stream of from 200 to 250 feet, Mr. Gregory estimates.



This is the type of country where veins are found. They are usually located by "detective" work in tracing placer gold up the valley to the veins from which it was eroded.

capital—after you have taken care to establish your priority in the matter of discovery. This situation is analagous to finding a big, low grade placer that will make money only when handled by quantity machine methods.

But in case you have hacked out ore showing specks of free gold, and the assay shows the ore rates $100 or better in gold—keep your head and get to work. Even a small ore vein if it is of this grade can be worked at the start by one or two men in a way that will bring them a real profit.

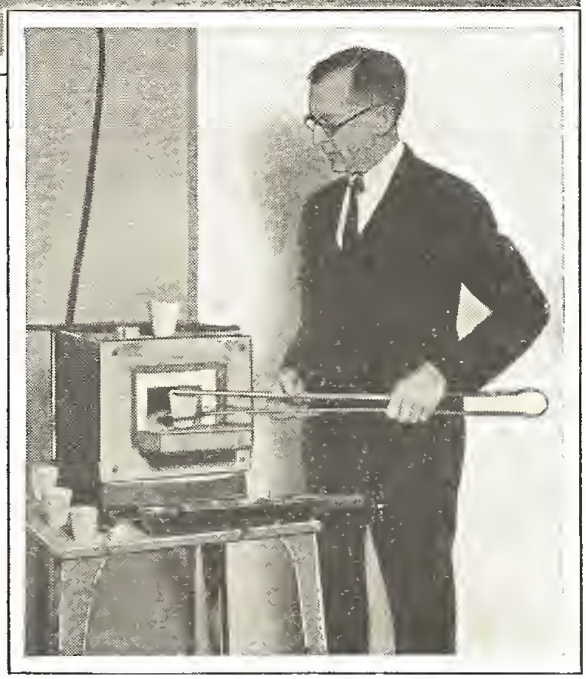
All that is needed to start mining of ore that runs as rich as $100 per ton is a pick, a shovel, a single jack hammer, some drill steel, a box of dynamite, some fuse, caps and ore sacks. One man can knock down a ton of such ore per day, sort and sack it, and have it ready to pack out to the smelter.

In former days the discoverer of a lode usually sold out to a mining company or formed a company, issued stock, gathered capital and built a big mill to reduce the ore to concentrates right on the site of the lode. Often the lodes did not prove of sufficient size to pay for such big mills. We have told of the application of modern machine methods and advanced design resulting in the 800 ton per day placer machine.

In just the same manner modern engineering now comes forward with a "vest pocket" mill, costing in the neighborhood of $3,000, with a capacity of from 5 to 15 tons daily. Many a little mine that was passed by or abandoned in early days because the ore body was not sufficient to justify one of those big, old cumbersome mills now can be made to pay with these little mills.

Knowing all the opportunities that are open for every type of find is a primary need of the prospector today.

That suggests one other bit of advice. You may not find gold. But you may be right on top of a fortune in molybdenum,



Small electric furnace for assay work. Due to increased interest in mining as a result of the depression, many firms are bringing out low-cost equipment for the miner.

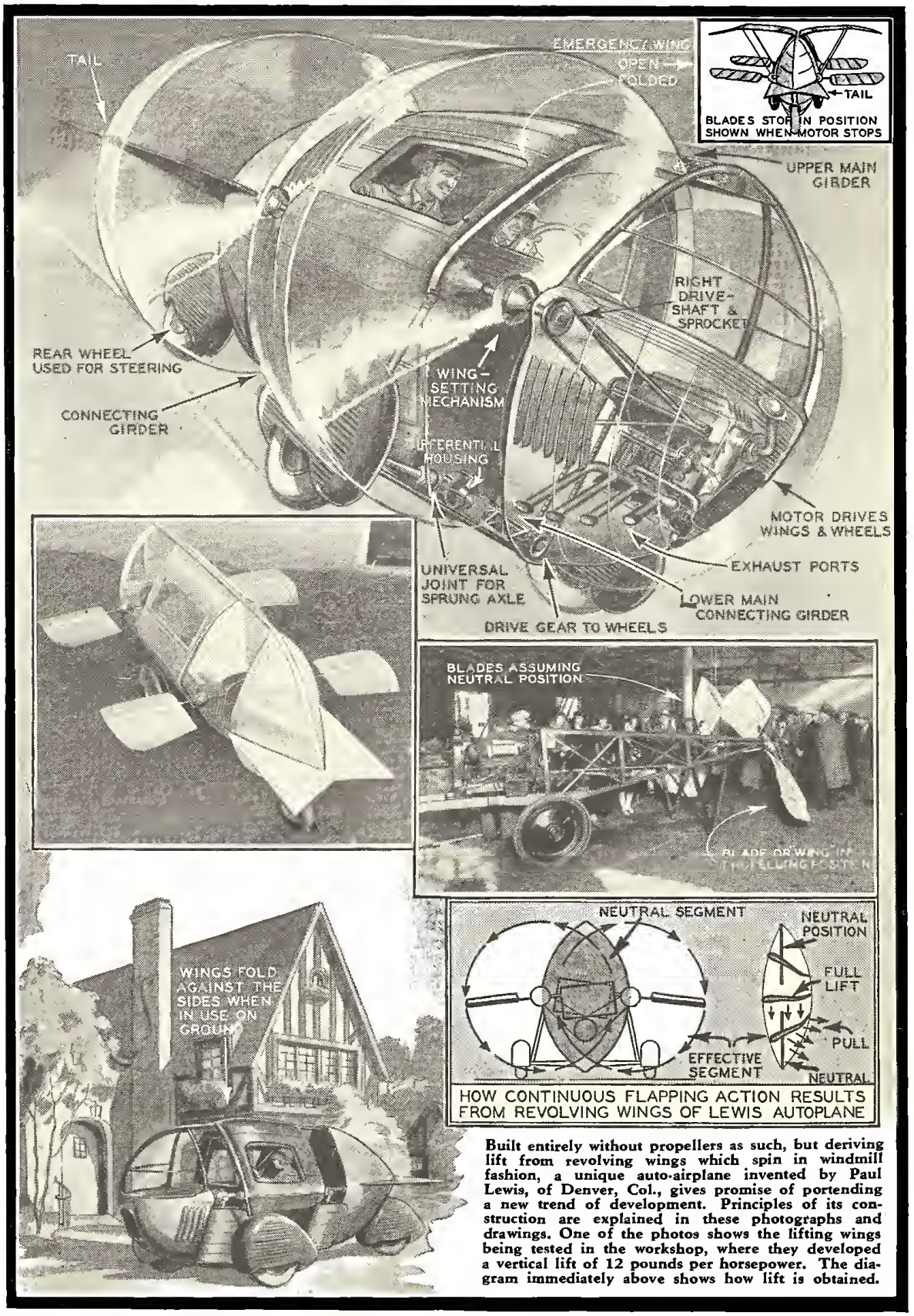
tungsten, vanadium or some other metal that, in the long run, will make greater riches than many a mediocre gold vein might. The wise prospector may start with placer gold but he does not stop there; he goes hunting but he carries more than the one cartridge to bring home the game. He plugs up with every bit of information he can assemble.

There is a gold rush on in our western mountains. There has been a lot of loose talk about the unemployed man equipped with nothing but a gold pan going out and making wages. He may. But if he does he either has a fool's luck or he has mixed a lot of savvy, horse sense and hard work. Knowing the game you play, how to play it, how to make goals, is vitally important to the gold miner today.

But the game is wide open to the fellow who goes about it systematically, in a business-like, dead-earnest manner.

So, best of luck. May you hit it rich!

Revolving Paddles Lift Odd-Style Plane

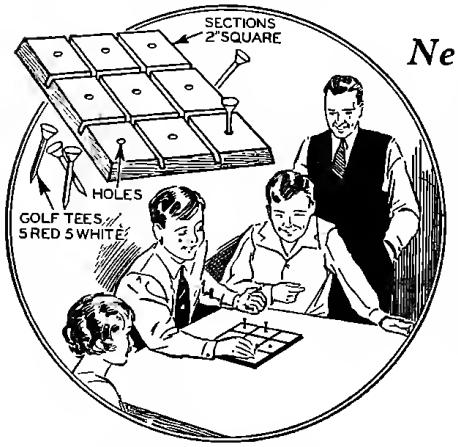


Built entirely without propellers as such, but deriving lift from revolving wings which spin in windmill fashion, a unique auto-airplane invented by Paul Lewis, of Denver, Col., gives promise of portending a new trend of development. Principles of its construction are explained in these photographs and drawings. One of the photos shows the lifting wings being tested in the workshop, where they developed a vertical lift of 12 pounds per horsepower. The diagram immediately above shows how lift is obtained.

Clever folding design of the wings makes it possible to use the autoplane as a three-wheeled car on the ground.

HANDIKINKS

Do you know any short-cuts or handikinks which readers of these pages would find valuable? Send your ideas in to the magazine; if they are new and novel you'll receive a check in payment at regular rates.

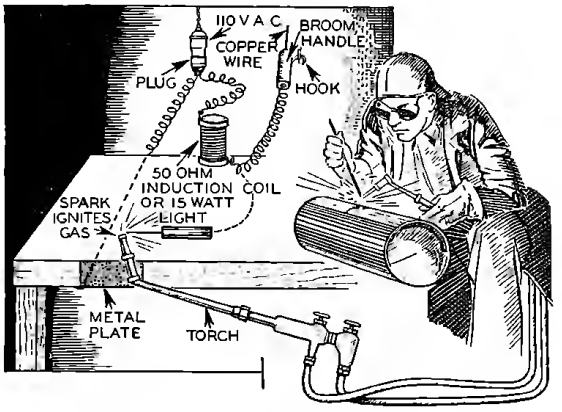


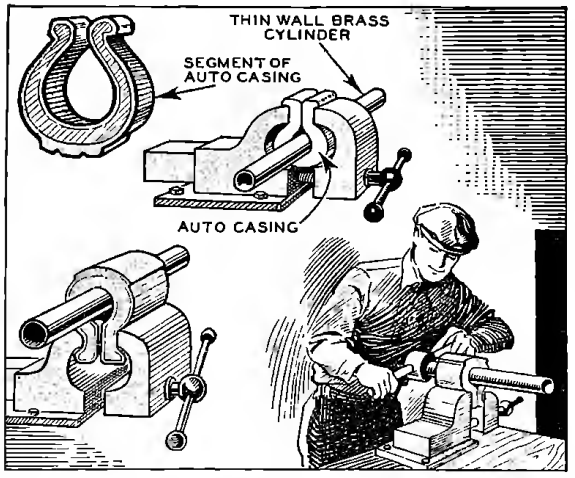
New Way to Play Old Game of "Tit-Tat-Toe"

"STYMIE" is a simple, new game for the children which can be easily made from a piece of three-quarter inch board, six inches square, and ten golf tees, five each of two different colors. Divide the board into nine equal squares by sawing shallow grooves across the board each way on two inch centers. Drill a hole in the center of each square just large enough to insert a golf tee and approximately five-eighths of an inch deep. The game is played in the same manner as tit-tat-toe. Each player has five tees of a different color. Each player inserts a tee in one of the holes in turn and attempts to secure three tees in an unbroken line.—H. R. Stevenson.

Electric Lighter for Gas Torch

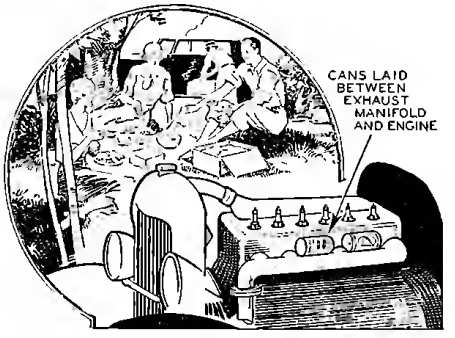
HERE'S an electric lighter for your oxy-acetylene torch which offers the last word in work shop convenience. The wiring diagram is seen at the right. One side of the 110 volt line runs to a small metal plate while the other goes to a 50 ohm coil or a 5-15 watt light, and thence to an electrode made of a broom handle and a short piece of heavy wire. To ignite the torch hold it against the metal plate and turn on the gas. When you touch the electrode to the tip of the torch the gas will burst into flame. Hang the electrode up on a nail when the job is done.—O. J. Gilman.





Vise Clamp for Delicate Jobs

WORKING on a thin-walled brass cylinder without bending it out of shape is a delicate job which may be handled satisfactorily by the use of a segment of old tire casing. The cylinder is placed in the segment and gripped in the vise as illustrated in the drawing at the left. This stunt permits you to hold the cylinder firmly for threading, etc. The grip is distributed evenly over the entire diameter of the tube, thus preventing a cave-in at any one point. Note that the bead comes inside the jaws.—A. H. Waychoff.

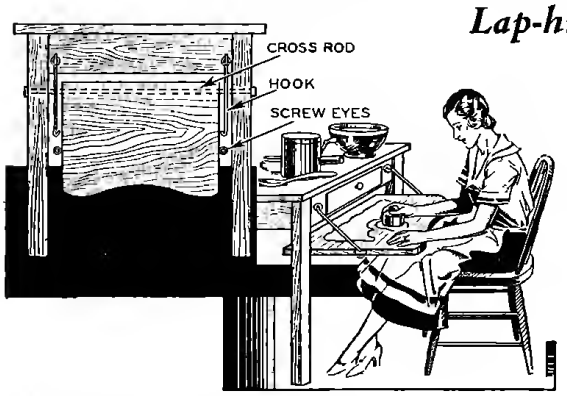


Motor Heats Canned Food for Campers

WHEN you're on auto-camping trip try this little stunt for warming up cans of beans, soup, etc. Simply place the cans in the cradle formed between the exhaust manifold and the engine. It's advisable to place them there as soon as you stop, so that you get full benefit of the heat.—Daniel Mammon.

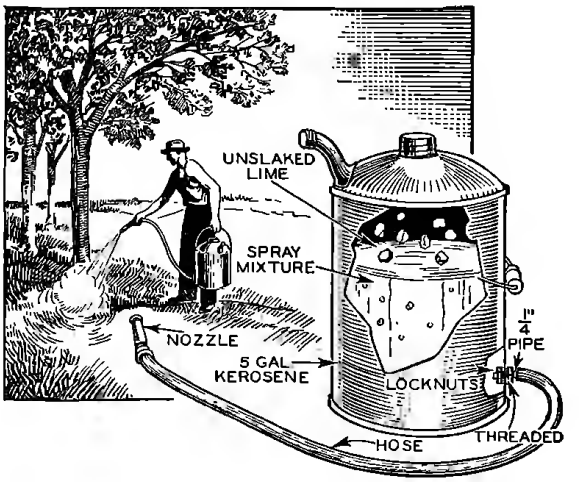
Ingenious Kinks for Handymen

Lap-high Extension for the Kitchen Table



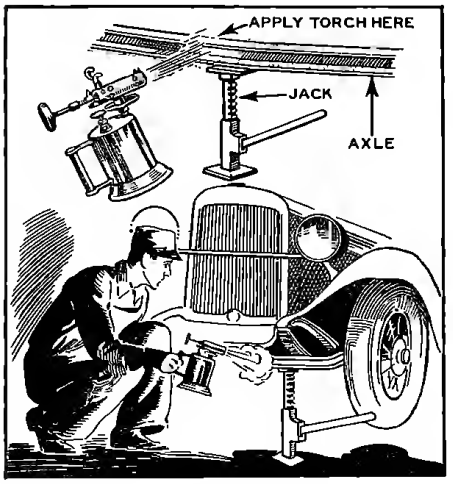
A LAP board attached to the ordinary kitchen table will save much back-straining labor for the average housewife. The extension consists of a board suspended between the end legs of table on a cross-rod, and may be quickly swung up into horizontal position and latched with the wire hooks at each side. This provides a table at which the housewife may work while comfortably seated in a common chair. Build to a height to suit yourself.—G. E. Hendrickson.

Tree Sprayer Makes Own Pressure



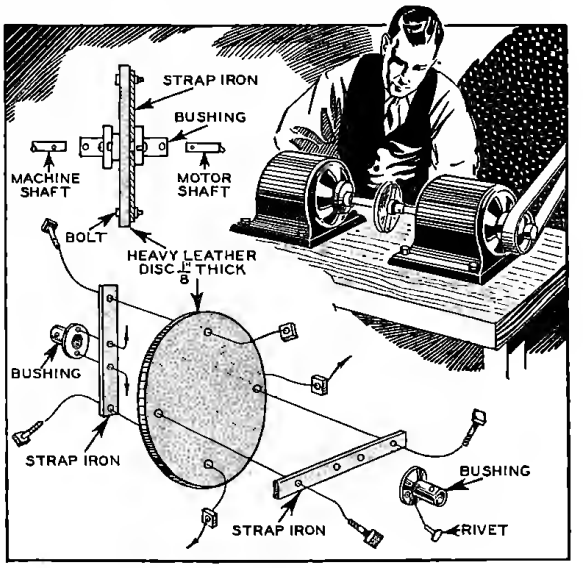
HERE'S a tree and shrubbery sprayer that generates its own pressure. The container is a five-gallon oil can. The attachment for the hose is made by cutting a thread on a piece of quarter-inch pipe, running it through a hole in the bottom of the can, and then making it secure with a couple of lock nuts. The hose then attaches to this outlet. For spraying, the can is filled about three-fourths full of the spray mixture. A little unslaked lime is then poured in and the cap replaced. The lime slaking in the water generates sufficient pressure to do a good job of spraying. A small handful of lime will completely empty the can.—Elmer Walloon.

Straighten Axle With Blow Torch



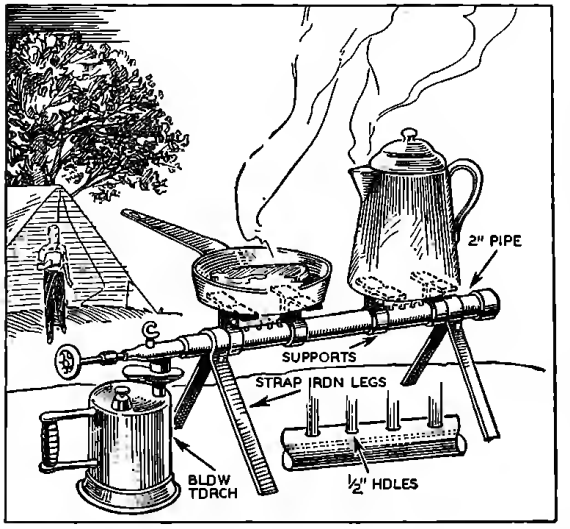
A SIMPLE way of straightening a front axle or eyebeam is to place a jack under the center of the bend, as illustrated in the drawing. Then jack up the car a few inches and apply a torch to the place just above the jack. The heat will cause the metal to soften and the weight of the car resting on the jack will straighten the eyebeam very slowly. Care should be taken to remove the heat as soon as the bar is straight. It should not be necessary to heat the metal more than a dull red color.—A. M. Johnson.

Flexible Coupling for Shop Motor



AN EFFICIENT flexible coupling may be made from scrap metal in your own workshop. A brief study of the sketch at right will show you how the trick is turned. Make sure that the collar bushings you use have inside diameters the sizes of the shafts to be coupled. To secure the bushings firmly drill holes through the neck and then down on through the shafts and insert a short bolt in the holes. Size of the disc will vary with the job.—Thomas L. Moore.

A Page for Outdoor Enthusiasts

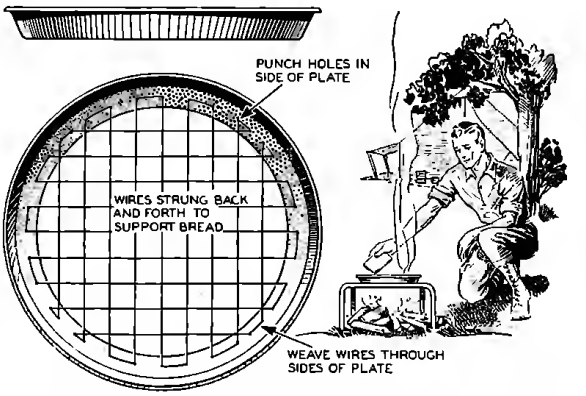


Camp Stove Made From Blow Torch

A SIMPLE gasoline camp stove can be made, by taking a piece of pipe about 18 in. long and large enough so that the spout of a blow torch can be easily slipped in one end of it, as illustrated in the drawing at the left. The other end of the pipe is closed off with a pipe cap. Several small holes should be drilled in the pipe in two places, so the flame of the torch may escape to strike the bottoms of the pans. Pieces of flat iron are fastened to the pipe near the holes in order to hold cooking utensils over the flame. Two other pieces of flat iron do duty as legs. They are bolted together under the pipe and spread out at the ends as shown.—Fred W. Schneider.

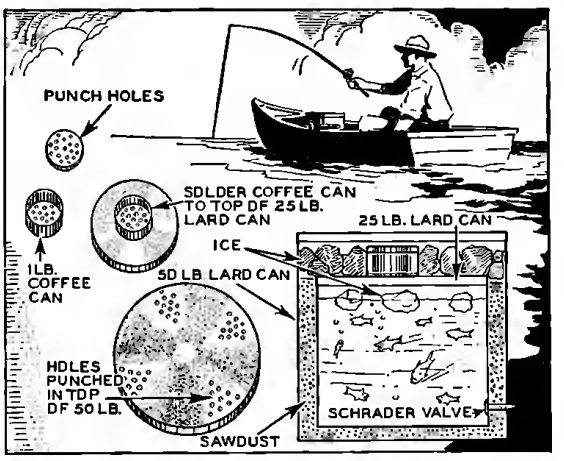
Handy Toaster for Campers

A VERY inexpensive but highly efficient toaster, suited particularly to camp or shore use, can be made quickly from a tin pie plate and a bit of wire. With a small nail, punch little holes through the side of the plate half an inch apart and a quarter of an inch from the bottom and string fine wire tightly back and forth across the inside, as illustrated in the accompanying drawing. A single strand from a length of picture wire serves excellently. Over a flame it takes but a few seconds for the bottom of the tin plate to get hot. Delicious, evenly browned toast can be made in a few seconds by laying the bread on the wire. —J. W. Bailey.



Minnow Container for Auto Trips

FOR transporting minnows by auto on your fishing trip there's no better container than this one. As shown at the left, a small lard can is fitted inside a large one, the tops of both being provided with ventilators. Note that a Schrader valve is soldered to the inner can. Through this valve periodically pump air into the can to aerate the water for the fish. Also supply them with a little ice now and then to keep them cool. To improve refrigeration qualities of the container and thus keep the fish full of pep, insulate the sides with packing made of sawdust. When you're fishing, remove the top so you can reach down occasionally and pick up a minnow to bait the hook with.—Frank Detrick.



Cut-out Window Signs Attract Attention

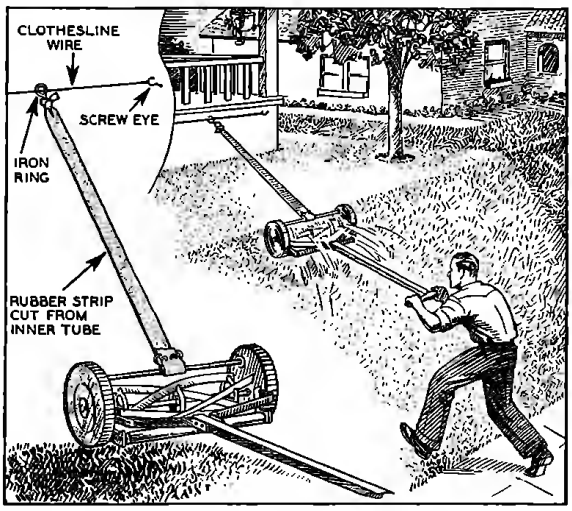
AUTO dealers will find it easier to make paper signs and paste them on their windows than to paint on the letters in reverse English. If the letters of the sign are cut out and pasted on the window as illustrated at the right, plenty of light will be admitted to make the sign far more attractive. The figures then appear in dark outline, adding to their stopping power.—Weston Farmer.



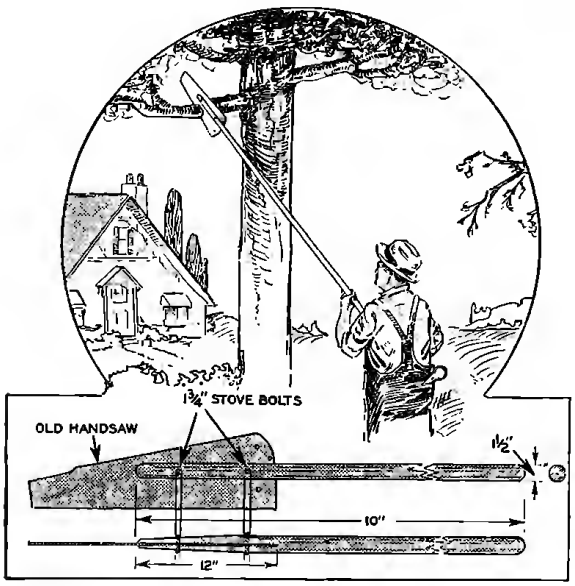
For the Man About the House

Rubber Band Mows Steep Terraces

MOWING steep terraces will be a far less laborious job if you hook a rubber band, cut from an old inner tube, to the cross bar of the mower as illustrated at the right. To the other end of the rubber band attach an iron ring, which slips along a piece of clothesline wire. With this arrangement, the operator has only to guide the mower when pushing it up hill. The rubber helps to pull it up and thus saves energy.—Dale Van Horn.



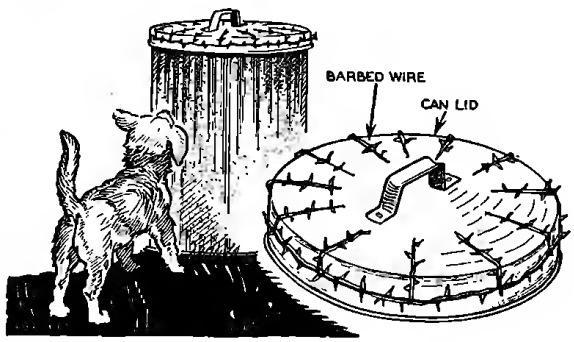
Tree Trimmer From Old Hand Saw



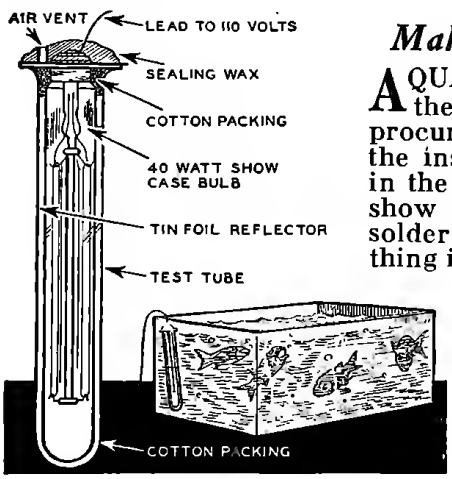
NO MORE crawling out on treacherous tree limbs when you've made this tree trimmer. It's nothing more than an old saw blade bolted to a handle of some kind as shown in the drawings. It's a good idea to put an extra large set in the saw to prevent any binding when sawing green limbs. The trimmer is also handy for sawing under water, where you want to get at snags.—O. E. Elsoe.

Barbed Wire Protects Garbage Can

DO THE dogs in your neighborhood have the annoying habit of knocking the lids off garbage cans on morning raids? If so, try this stunt. Around the flange part of the lid wind a couple of turns of barbed wire, soldering it down at intervals. Then take several short scraps and solder them on the top as illustrated in the drawing. This arrangement in no way interferes with the duties of the garbage man, but it's a pain in the nose to stray dogs. Do your soldering job up in regular manner.—A. H. Waychoff.

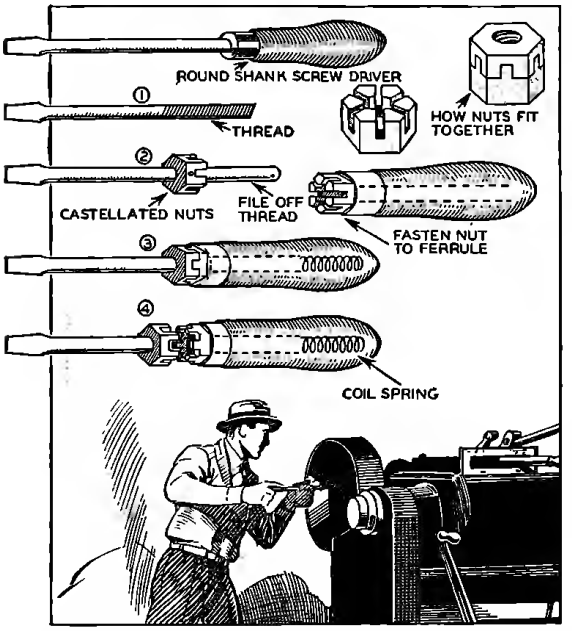


Make Your Own Aquarium Warmer, Heater



AQUARIUM enthusiasts will find this stunt an answer to their prayer for an efficient heater and reflector. First procure a test tube about 11½ in. long and coat one-half of the inside, lengthwise, with tinfoil, using glue. Now down in the bottom stuff a little cotton, and then insert a 40-watt show case bulb. In the top pack a little more cotton, and solder leads onto the screw and cap of the bulb. The whole thing is then sealed with pitch from an old dry cell. A match is held in the tube, and then removed after the pitch has begun to harden, leaving a hole to admit air. Finally place the light in the corner of the aquarium, with the tinfoil towards the outside. Your aquarium will then be brightly illuminated from the light and reflector and warmed from the heat of the lamp. You'll be proud to show visitors your aquarium with this reflector on the job.—Albin J. Stock.

Labor Savers for the Workshop

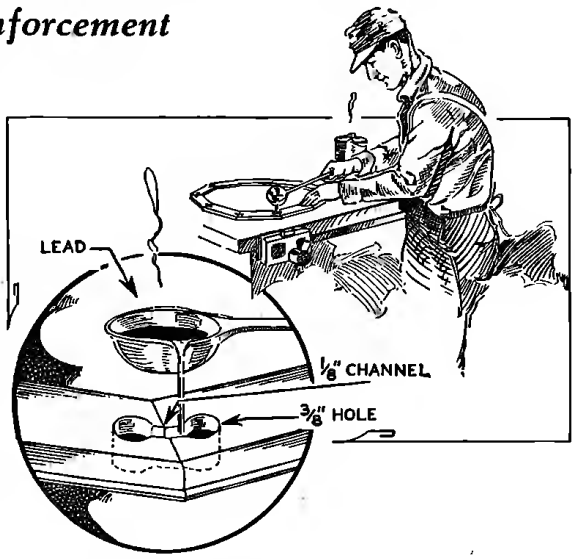


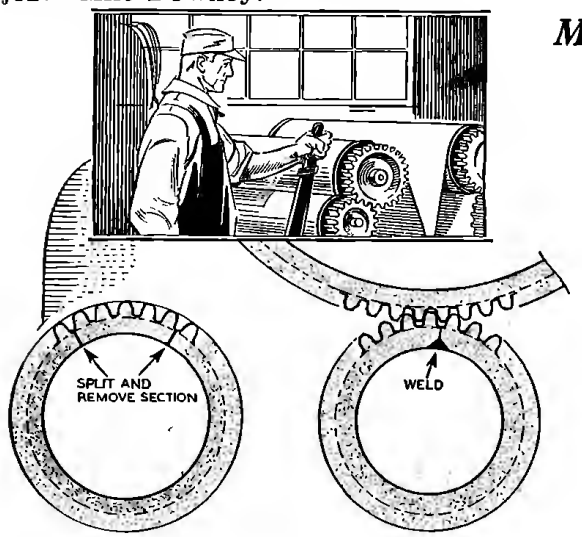
Easily Made Ratchet Screwdriver

A RATCHET screwdriver that will work as satisfactorily as a store-bought job can be turned out in your workshop. First lay violent hands on a regular screwdriver and yank out the shank. Then thread it as illustrated in 1, and screw on a castellated nut, which is to be the mate to another nut set in the handle as in 2. Next bore a small hole through the nut and the shank to take a small pin. The second nut is then fastened to the ferrule on the handle, and pinned fast, the empty spaces being filled with babbitt metal. A short coil spring should be placed in the hole left by the removal of the shank, and held by a pin through the handle. Adjust the spring to any tension you like. The shank, which has been filed down, is reinserted, making the screwdriver ready for work. When you bear down on the handle, the castellated nuts mesh and twist the screwdriver any way you want. It will work almost as well as a store bought job.—Don Lallen.

Dumb-bell Wedge Makes Strong Enforcement

SHOPMEN will welcome this new type of joint enforcement for large angle joints because of its simplicity and durability. To make it proceed as follows: Place pieces to be joined in position, and bore holes ½ in. from edge of each piece as illustrated in the drawing. Then cut the channels shown. It's advisable also to undercut them to prevent lead wedge from dropping out. To hold in position for pouring, place glue on edges, press into position and lay on a flat surface. Fill channel and holes heaping full of hot lead and let it stand until cooled. File the lead down to the wood surface and polish with a sharp scraper or emery cloth. Proceed with the next joint in the same manner until all pieces are assembled. You find this stunt handy for screens, doors, furniture—anywhere where you need a solid job.—Milt Downey.





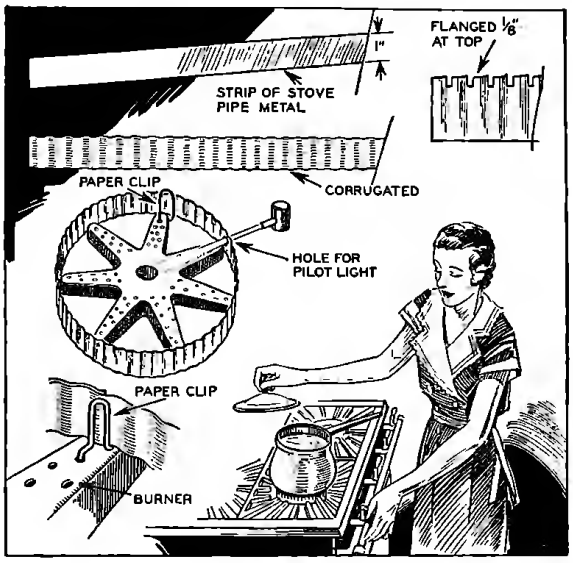
Making Small Gears From Large Ones

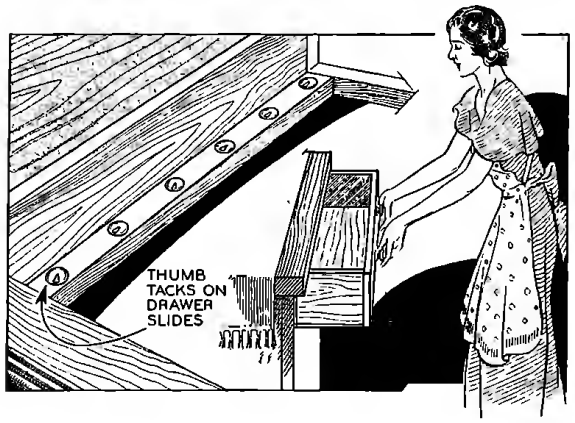
IF YOU'RE ever in a pinch and have to make small gears from larger ones try this ingenious kink. The gear which, incidentally, must have the correct pitch and tooth form for the job, must first be put in a lathe and the part containing the teeth cut away from the hub and web, about ⅜ in. inside the root diameter. Next a section is cut out of the resulting ring gear, leaving the number of teeth desired, and with enough stock remaining to keep the teeth the correct distance apart. Then weld, as illustrated. The ring gear may now have an oval shape, but this can be remedied in a vise. Another hub and web suitable for the job are now turned down to a diameter so that the ring gear when heated a dull red can be shrunk on. Finally weld and smooth off.—Rolland Peterson.

Simple Items of General Interest

How to Save Fourth Your Gas Bill

A SIMPLE and clever gas saving device can be made for the kitchen range with a strip of tin and a piece of wire. The object of this strip of tin—which can be a strip of metal cut from an old stovepipe—is to eliminate waste by confining the heat immediately above the burner and to keep the pans from being scorched around the sides. The strip should be about 1 in. high and its length should be equal to the distance around the burner. The device is held in place by a paper clip as illustrated in the drawing at the right. When cooking the gas needs only to be turned up to about three-fourths its normal blast. As no heat escapes this will serve as well as a full flame. The pan rests on top of the strip as illustrated. The corrugations allow a small opening to spread the flames, but permit no waste as is the case with the ordinary burner.—Walter Brixius.



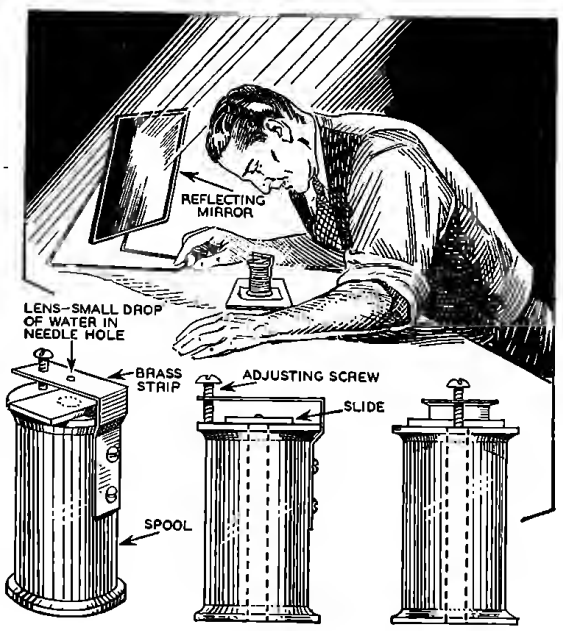


Stubborn Drawers Slide Easily

THAT wretched drawer in your bureau or dressing table which has an annoying way of sticking can be brought to terms by the use of a few thumb tacks. These should be disposed along the slides as illustrated at the left. The bottom of the drawer slides on the smooth surface of the tack heads, so that the drawer will always pull out with a minimum of coaxing. It might be necessary first, however, to plane down the bottom of the drawer to get a good fit and leave plenty of leeway for the drawer to slide in. The thumb tacks can be procured at any stationery store for a dime or fifteen cents. The more you use the better the drawer will slide.—John E. Leek.

Drop of Water Makes Low-power Microscope to Study Secrets of Nature

THIS thread spool microscope is designed to use the magnifying characteristics of a drop of water. A spool, fairly large, has a half-inch wide strip of springy brass fastened to the side and bent over the top with a quarter inch space between the gap and the spool. After passing a piece of wood into the gap to support the strip a needle hole is bored in the brass centering on the hole in the spool. A quarter of an inch from the free end of the strip another hole is bored to take a bolt a half an inch long for adjusting the lens to the right distance from the slide. The lens is a small drop of water placed in the needle hole. The specimen slide, which may be a piece of window glass, goes between the lens and the spool hole. In order to avoid tiring the arms holding the microscope to the sun or light globe a mirror may be rested against something so as to reflect the light into the lens while the elbows rest upon the table.—Adjust the strip, and thus the lens, by turning the adjusting screw in or out, just as you find necessary.—Harry E. Throsel.



BUILDING "Wooden Shoes"

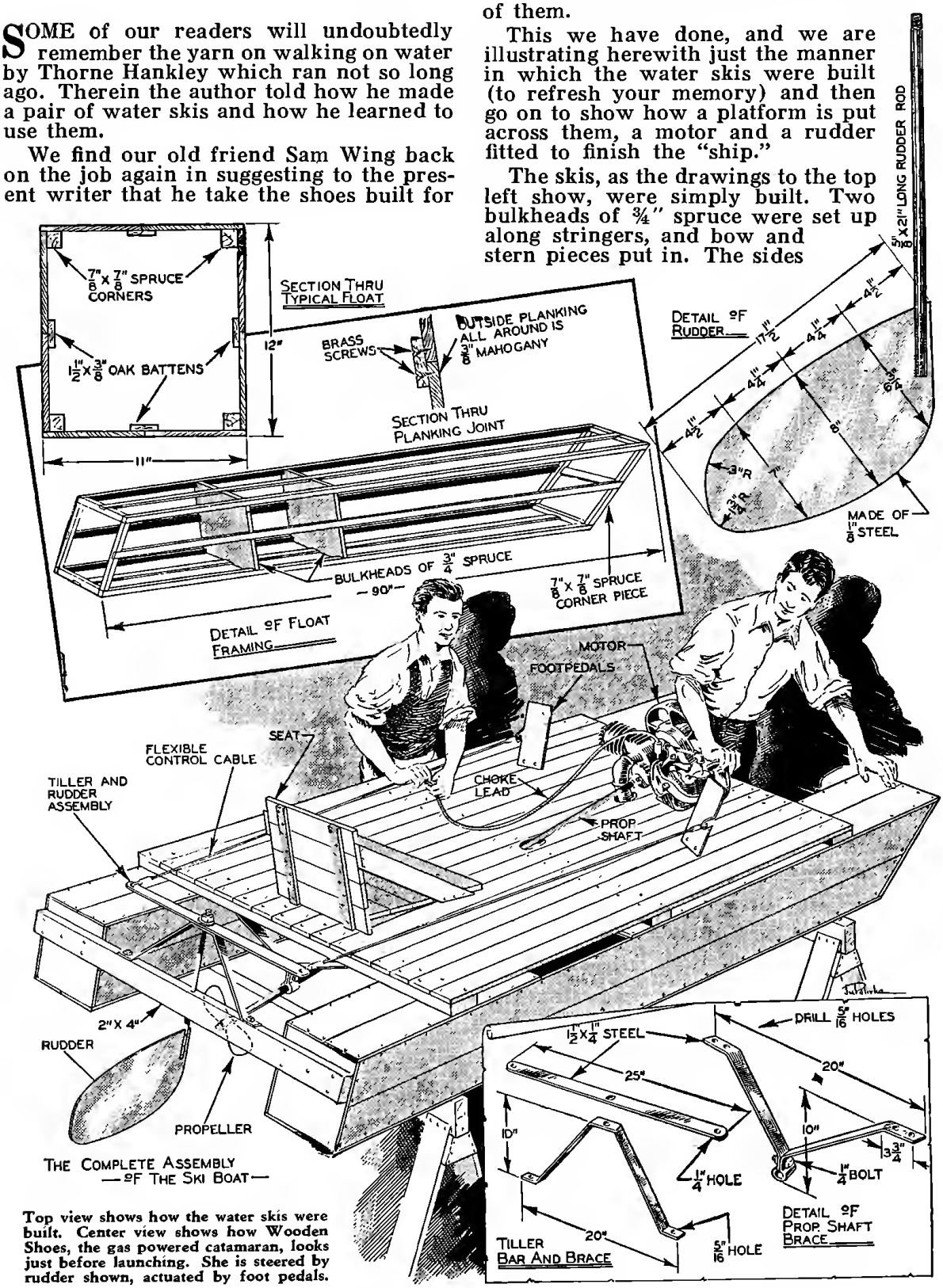
by WESTON FARMER

SOME of our readers will undoubtedly remember the yarn on walking on water by Thorne Hankley which ran not so long ago. Therein the author told how he made a pair of water skis and how he learned to use them.

We find our old friend Sam Wing back on the job again in suggesting to the present writer that he take the shoes built for Hankley by the Experiment Station and make a little double hulled motor boat out of them.

This we have done, and we are illustrating herewith just the manner in which the water skis were built (to refresh your memory) and then go on to show how a platform is put across them, a motor and a rudder fitted to finish the "ship."

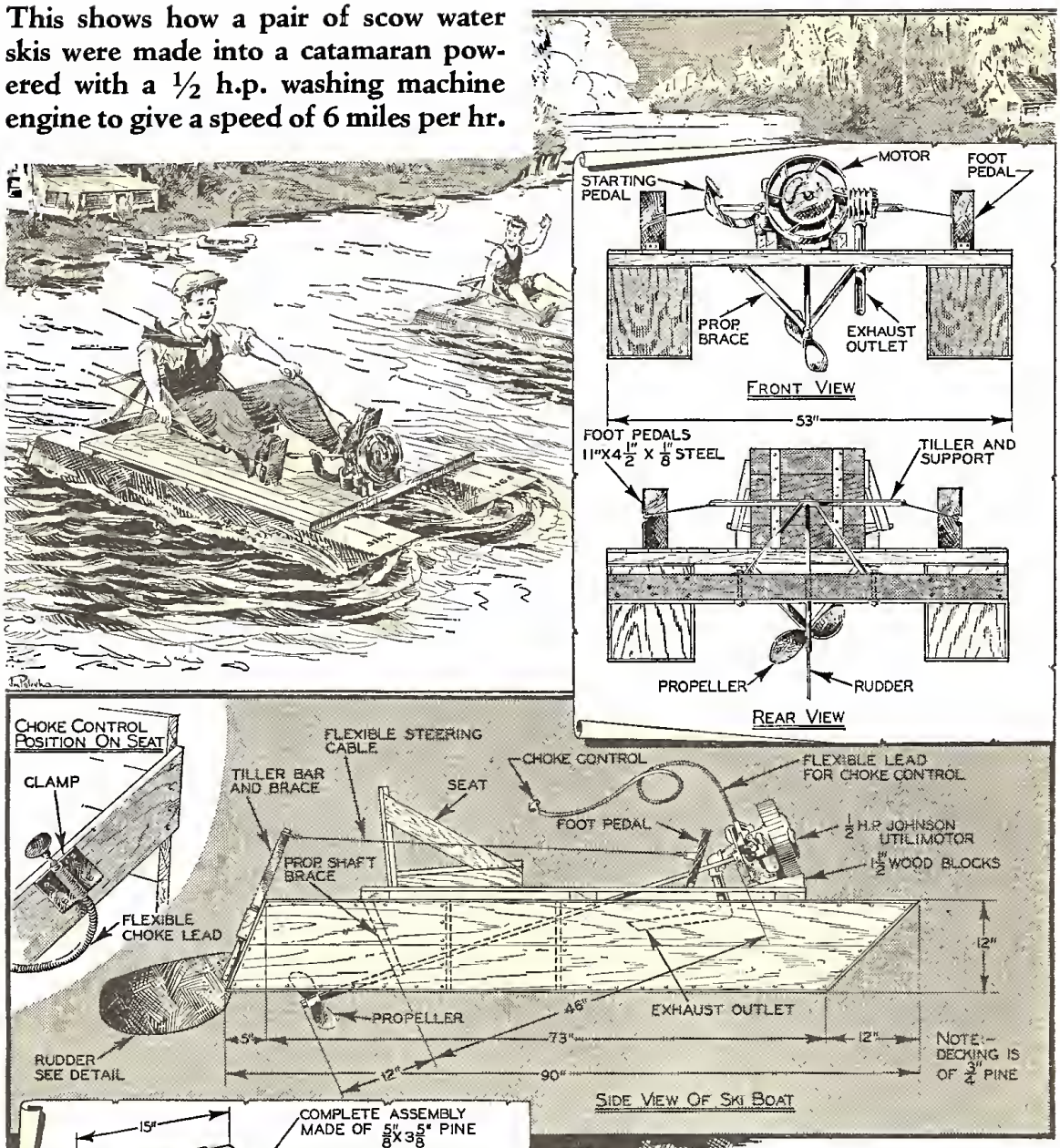
The skis, as the drawings to the top left show, were simply built. Two bulkheads of ¾" spruce were set up along stringers, and bow and stern pieces put in. The sides



THE COMPLETE ASSEMBLY —OF THE SKI BOAT—

Top view shows how the water skis were built. Center view shows how Wooden Shoes, the gas powered catamaran, looks just before launching. She is steered by rudder shown, actuated by foot pedals.

This shows how a pair of scow water skis were made into a catamaran powered with a ½ h.p. washing machine engine to give a speed of 6 miles per hr.



Dimensions for the side or bottom stringers of the seat are shown in the drawing above, together with dimensioned detail of the seat. Ordinary pine is quite all right to use for this.

were planked with ⅜" mahogany, which is as cheap as cedar and holds fastenings better than any other boatbuilding wood, and then the top and bottom were planked. The resulting shoes had their centers of buoyancy and gravity right where the foot wells came.

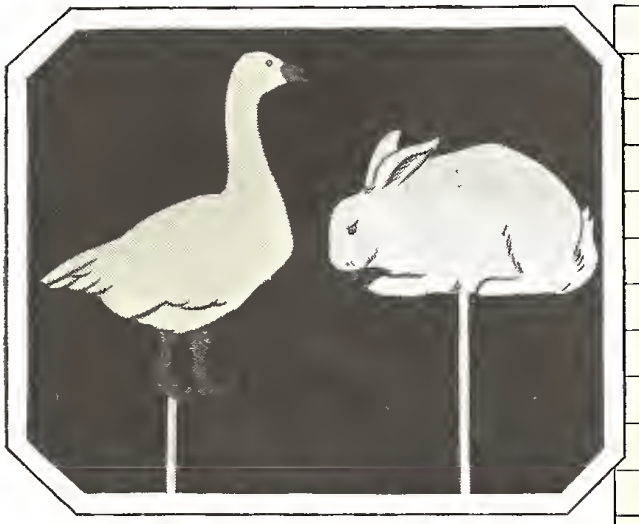
The motor choke control is run to the seat side. The one-half horsepower Johnson Utilimotor (washing machine engine) is shown in the outboard profile and elevation plans, showing manner of installing. Sam Wing can furnish the propeller.

Ergo, it became a simple matter to take these hulls and put on a platform on which a seat and a little Johnson ½ h.p. Utilimotor could be installed. Incidentally, the Experiment Station bought a lot of these little motors, and has sold a lot of them, too. We have a few left which are going at the figure of twenty bucks, complete, new, with gas tank and built in flywheel magneto. They develop ½ h.p. at 1750 r.p.m. and have been used by numerous home experimenters in building their little midget autos and the like.

Three two by fours 53" long join the

(Continued on page 126)

Wooden Figures Decorate Garden, Lawn



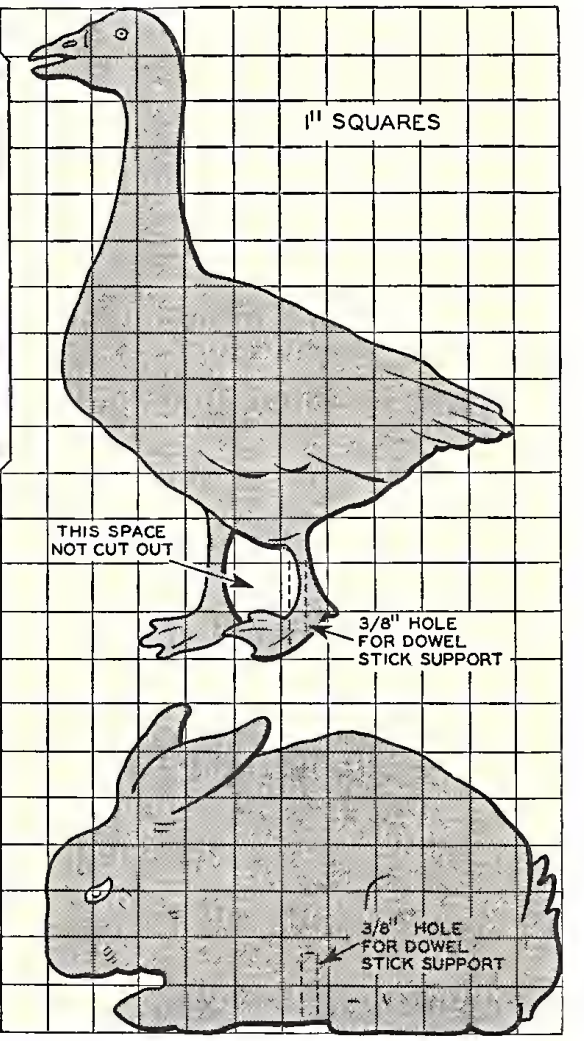
Here's how your garden ornaments will look when they're completed. Note how features are outlined in black lines.

YOUR garden, lawn, or flower bed will take on an improved appearance with the addition of a few of these little ornaments. They can be turned out in a few hours from old scrap lumber and they will give an unique air to your grounds.

The figures may be cut from whatever material you have available, but ¾ in. white pine is preferable. The squared chart at the right will furnish you with a guide for shaping either a duck or a rabbit.

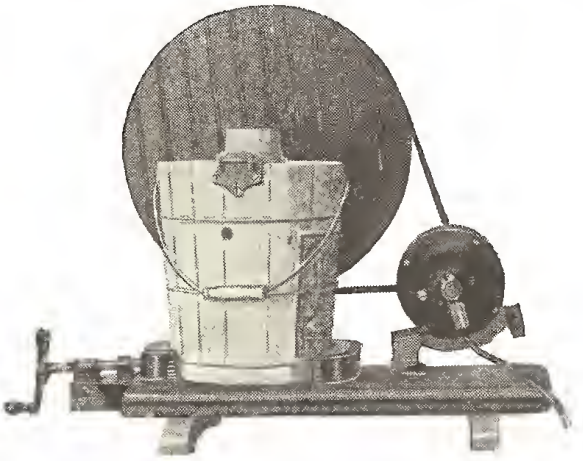
The figures rest on ⅜ in. dowels, which are inserted in the bottom of the figures at the points illustrated. These dowels are driven down in the earth to hold the figure steady.

As for the painting job, do the bodies in white and outline the limbs, feathers, eyes, bills, etc., in black. A touch of green will also help.



Cut out the ornamental figures according to dimensions shown on this squared chart. The ⅜ in. dowel which fits up into the holes in bottom should be glued for firmness.

Electric Motor Belted to Hand Freezer Makes Ice Cream While You Loaf



How elements of electric freezer are arranged. Flywheel may be attached to shaft with pipe flange or by strap iron embedded in wood. Hinging motor keeps belt at right tension.

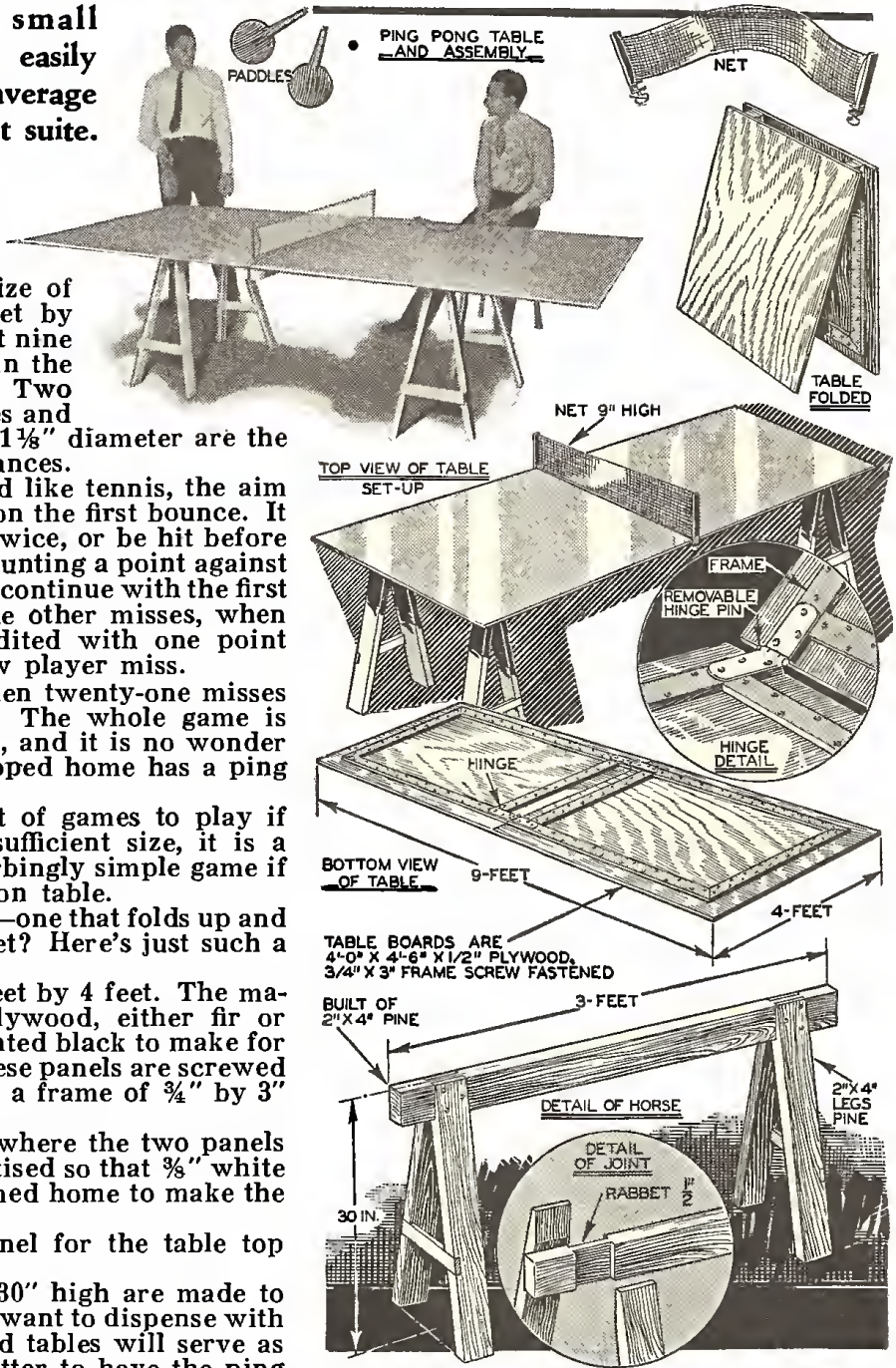
HOME-MADE ice cream is lots of fun but freezing it is another story. With this stunt in operation, however, you can make cream while you loaf.

The freezer itself is an ordinary hand freezer, with the handle removed and a 17½ in. wooden wheel fitted to the shaft. The wheel is made up of two thicknesses of any ½" material placed at right angles and nailed. They may be attached to the freezer shaft with pipe flanges. A V is cut in the edge for the belting.

Any old ¼ h.p. motor will do for a power plant. Hinged to the base as shown in the photo, the motor will keep the belt always at correct tension. The clamps which hold the freezer on the base are made up of discarded parts of old bar clamps, but any arrangement can be used which will hold the can solid. About 100 r.p.m. is the proper speed for the flywheel for a quick and tasty freezing job.

Build This PING-PONG Table

—it folds into a small space and can be easily closeted in the average home or apartment suite.



The table shown in the photo was built from the plans diagrammed here. The standard size is nine by four feet. This table will fold and can be housed in a closet that will hold an ordinary card table. Top is half-inch plywood.

THE game of ping pong is essentially like tennis, but is played on a table top. Officially the size of the table is nine feet by four feet. A small net nine inches high is used in the middle of this court. Two small wooden paddles and a light celluloid ball 1⅛" diameter are the only other appurtenances.

The game is played like tennis, the aim being to hit the ball on the first bounce. It cannot hit the table twice, or be hit before it bounces without counting a point against a player. The volleys continue with the first serve until one or the other misses, when the opponent is credited with one point for making his fellow player miss.

The game ends when twenty-one misses have been recorded. The whole game is just as simple as that, and it is no wonder that every well equipped home has a ping pong set these days.

One of the hardest of games to play if the table is not of sufficient size, it is a fascinating and absorbingly simple game if played on a regulation table.

Why not build one—one that folds up and tucks away in a closet? Here's just such a design.

The tops are 4½ feet by 4 feet. The material is half-inch plywood, either fir or basswood, and is painted black to make for greater visibility. These panels are screwed from the backside on a frame of ¾" by 3" white pine.

On the face edges where the two panels join the frame is mortised so that ⅜" white oak slats can be jammed home to make the joint tight.

This forms the panel for the table top proper.

Two small horses 30" high are made to hold the table. If you want to dispense with these things, two card tables will serve as supports, but it is better to have the ping pong court just the right height and card tables are a little low.

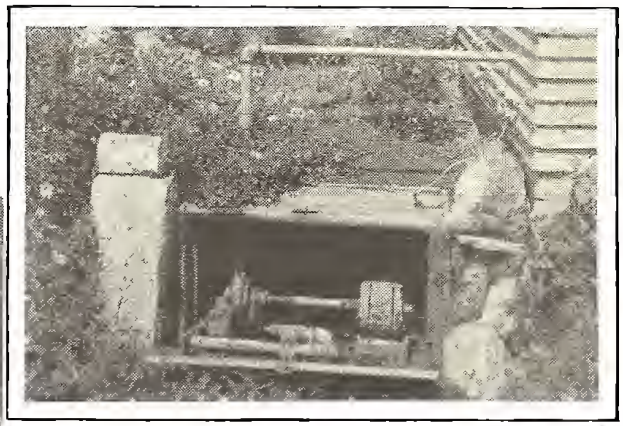
The method of making these horses and their dimensions are shown in the drawings.

The cost of a table like this is slight. The panels will cost around two dollars apiece and the lumber for the frames and the horses should not cost over a dollar. Thus for five dollars a fine ping pong court can be had by anyone with the will to do a little sawing and trimming work. As shown, the legs are regulation height for comfortable playing without tiring the back or leg muscles. The matter of leveling up the horses is best done with wedges like slivers from shingles. You will find that even if you make the horses very carefully and have the legs all the same length, few floors will be even enough to give solid footing. Place the wedges under the legs and shim them up as needed.

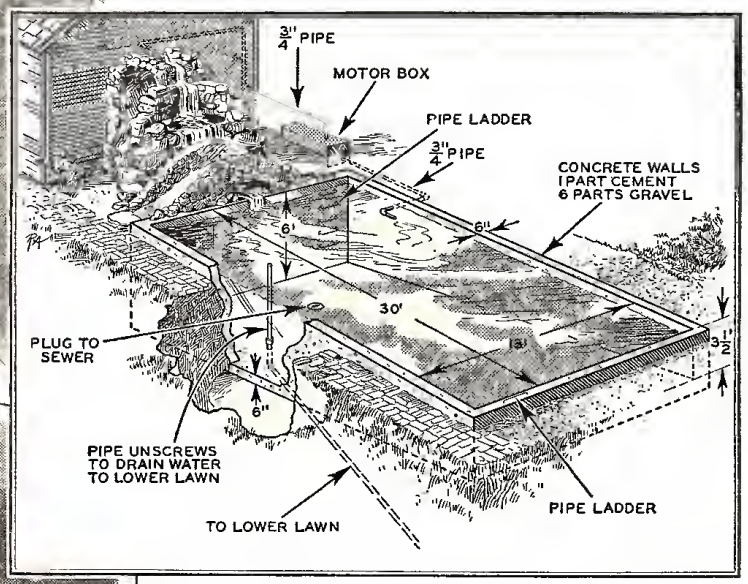
REVISED EDITIONS *of*



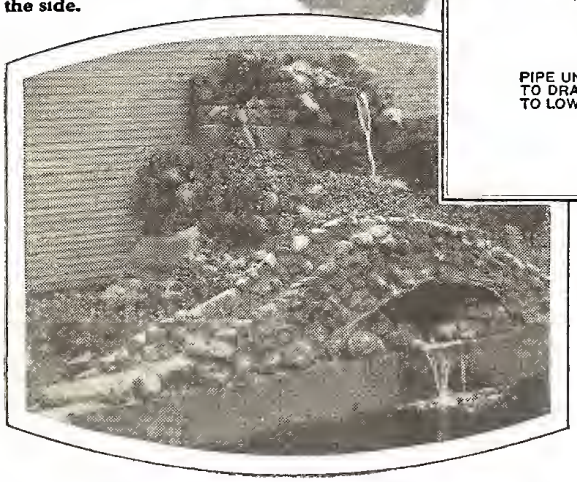
The Studnicka pool has rock seats and generous walks along the side.



Here is washing machine motor and centrifugal pump which sucks up the water in the pool and delivers it to the falls.



This shows layout of Studnicka pool mentioned by Dale Van Horn in his accompanying text. The water is dosed with chloride of lime to prevent formation of green algae.



This rock garden and waterfall was built at one end of the pool shown above in order to properly circulate the water.

by DALE VAN HORN

"OR TAKE the case of Jim," my friend continued. "Jim planned for several years to make a trip back to his boyhood home. He longed to hang his clothes on a limb and sport about in the old swimming hole. His plans finally materialized. He could scarcely wait. Doing as of old, he disrobed, poised for a moment on the bank, then dove in. Up came a disheveled person spitting mud. Slime ran down his face, out his ears, through his hair. Climbing out he cut his foot on a broken bottle.

"That trip cost Jim around $120. Hurrying home, he still had time enough to put a small pool in his back yard before his vacation was up. And now he desires nothing more than frequent dips in this manmade affair, lacking mud banks and a genuine naturalness perhaps, but devoid of slime, mud and sharp things on the bottom," my friend concluded. Later I found that Jim was no other than the narrator.

Backyard pools are growing in popularity and this spring will see thousands of such retreats built in devious shapes and sizes on as many back lots. If you think such a layout is prohibitive in cost and requiring too much space, you are mistaken. For I am not talking, folks, of a country club pool, or the pool back of the Ritz. To quickly comprehend, take a glance at the

"Ye Olde Swimming Hole"

pictures herewith, then if you enthuse, read on.

To be specific, here's the case of the W. E. Studnicka pool. Thirty feet long, 14 feet wide, it has circulating water at the turning of an electric switch. The walls and bottom are of concrete 6 inches thick. Plenty of reinforcing at the corners have held this wall through four useful summers and as many severe winters—without cracking. This pool, built largely that a daughter Marcella might build up physically, lies behind the family garage. Abutting against the rear of the building is an archway of typical field stones—glacial rocks—which is the east beginning of a tumult of more rocks, planned with careless precision. For it is over this vast array of stones and mortar that the water from the pool is pumped, over and over again, to keep it circulating and to properly aerate it. First the water empties from a short pipe protruding through the garage wall. It splashes and falls from the top of the archway down to a small pool perhaps 12 inches across. From here it trickles over and around more rocks, reaches another tiny pool and from there rushes under the cobble stone arched bridge and into the pool itself in another miniature waterfall.

This particular pool of the Studnicka's is set in compact clay and so no outer forms were required down to the bottom. However, both outside and inside forms should be used if the soil is apt to cave or is loose. And in any event outer forms should be used to a foot below the ground line. If both inside and outside forms are used throughout, the simplest method is to mere-

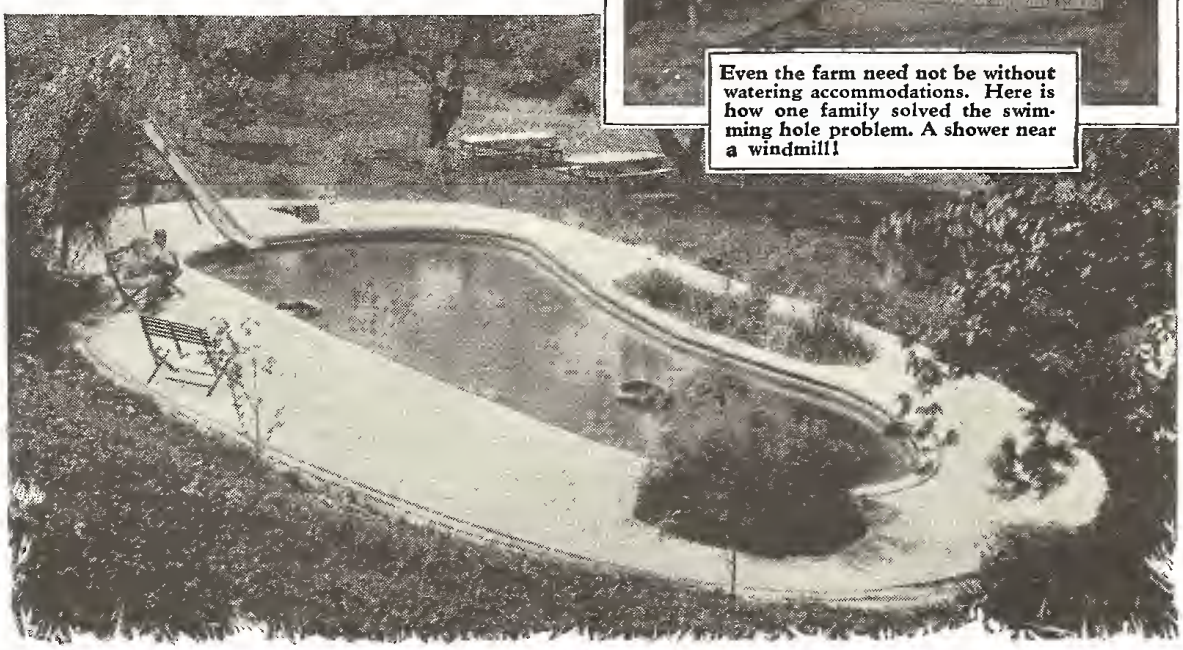
(Continued on page 124)



Here's a simpler pool made of silo blocks, which is very easy to build. A chute offers variety from limited accommodations.

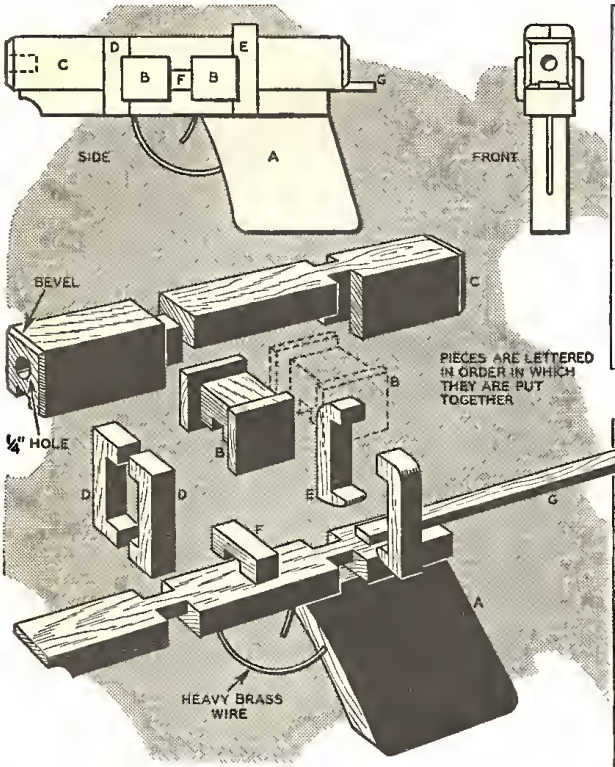


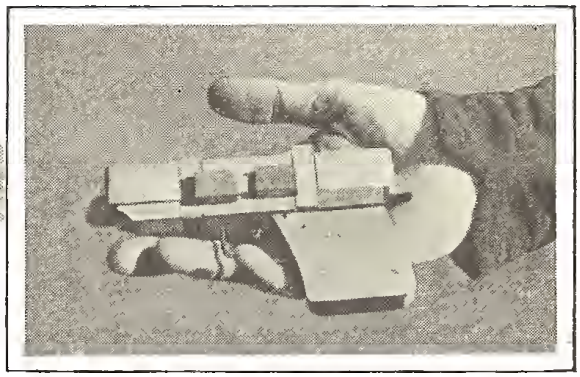
Even the farm need not be without watering accommodations. Here is how one family solved the swimming hole problem. A shower near a windmill!

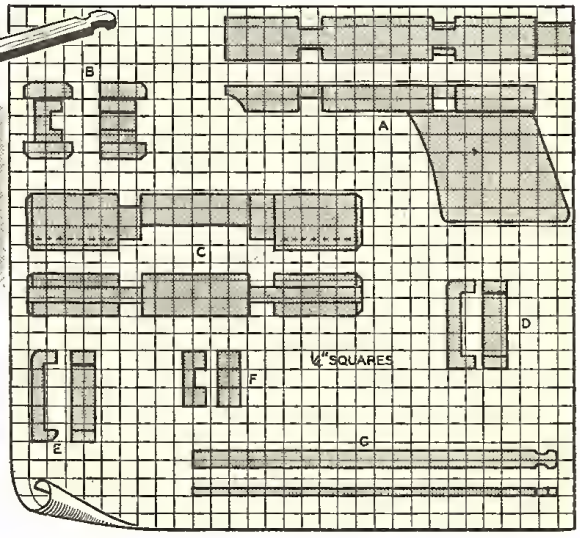


If the yard affords the room, a pool like this can be built for less than a hundred dollars, contrary to popular belief.

Test Your Wits with Oriental Gun Puzzle







Cut out various elements of puzzle with the chart at right as guide, then assemble the pieces as illustrated above. Completed puzzle has appearance of an automatic pistol.

HERE is a new block puzzle from the Orient which demands some little study to put together, and when assembled makes a neat model of an automatic pistol.

It is a job for a fine-toothed hacksaw and a sharp penknife. Any close-grained wood, such as maple, is satisfactory. The squared drawings give two views of each part. Note that "A" is made up of two pieces glued together, and has a trigger and guard made of heavy-gauge brass wire. One only is required of "A", "C", "F" and "G". Parts "B", "D" and "E" require two each.

The parts are lettered in the order in which they are put together, as indicated in the perspective drawing. In making them it is well to fit as you go along. That is, first make "A", then make and fit in the other pieces as you proceed. A piece of medium grade sandpaper glued to a 3/16 in. piece of wood will help materially in getting a snug but easy fit.

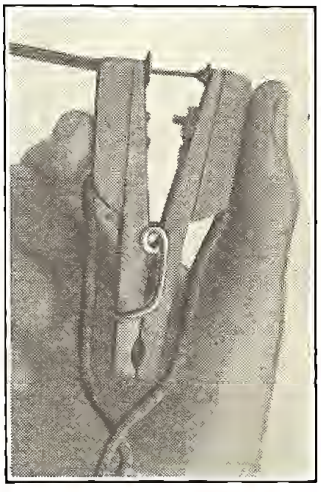
For appearance the ends of the barrel are beveled, as indicated, and a ¼ in. hole drilled a short way in the muzzle. The job should not be painted, as this would cause the pieces to stick more or less. A clear oil finish would be more satisfactory.

If you want to have fun disassemble the gun and give it to a friend to reassemble. The unique arrangement of the parts will test his wits, for finding the key job is a tough task.

Synchronizer for Photoflash Bulb

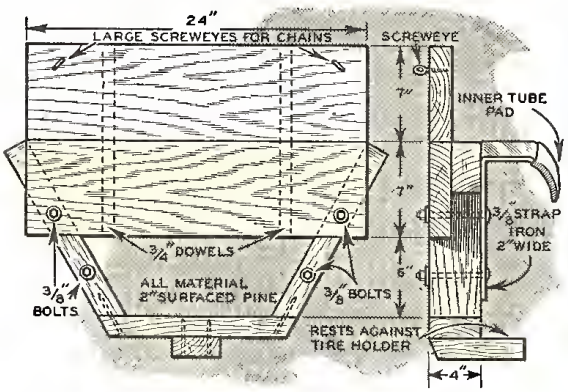
A VERY efficient switch which synchronizes the shutter click with the flash of a photoflash bulb can be made from an old clothespin. Utilizing a long pin, glue a small piece of wood about ⅝ in. square to outside of each handle as shown. Then round out a slot in one handle end to hold the cable release, and drill a slight depression in the other to take the push button.

The two contacts are mounted about ⅝ in. from the end. One of these is a small brass screw, the other is a stove bolt. Drill slanting holes in the wood pieces for wire leads to the bolts. Screwing stove bolt contact adjusts flash.



Pressing handles snaps shutter and sets off the photoflash bulb.

This Wood Rack Carries Outboard on Rear of Your Car

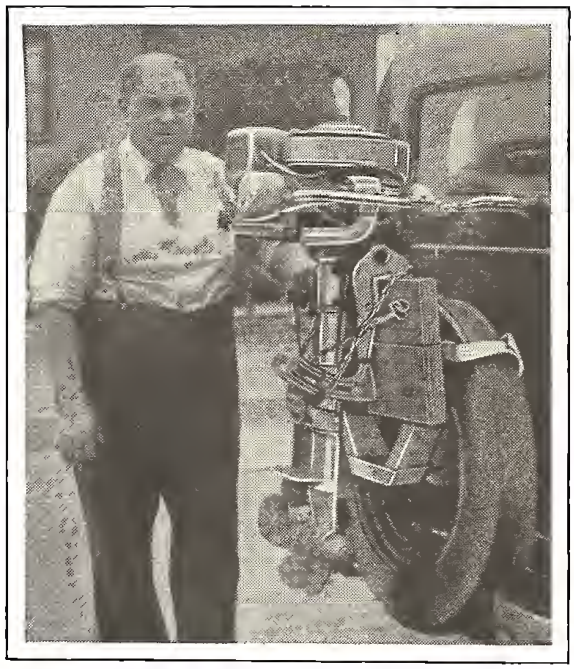


Details for construction of rack to hold outboard motor.

THE inconvenience of transporting an outboard motor is reduced to a minimum if you will build this wooden rack on the back of your machine.

Dimensions and materials used are given in the accompanying drawing. Note that the ¾ in. dowels hold the main supporting boards together. Two 4 in. cross beams are then bolted diagonally across the bottom board, and are braced with a short block at the bottom. At the bottom is nailed a block of sufficient length to rest against the tire holder.

Bend the strap iron hook to fit snugly over the tire. To prevent chafing sheathe the metal in inner tube rubber. Finally mount the large screweyes in the positions shown, so that the outboard motor can be securely held when the chains are wound around parts of the motor as illustrated in the photograph.



Chain and clamp hold motor firmly in position as shown.

Camping Kit for Running Board

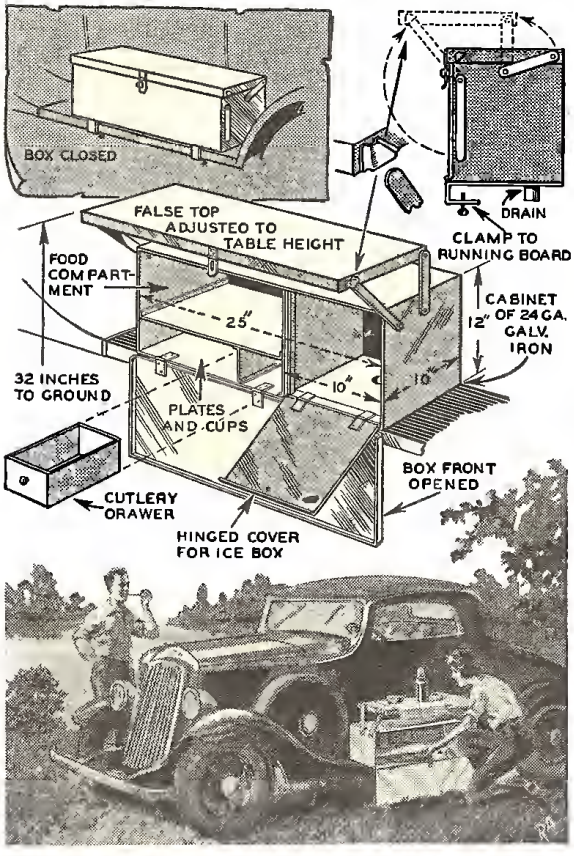
ABOUT the last word in camping convenience is this little running board kit. It folds up like a small tool case as illustrated in the accompanying drawings, and unfolds to disclose a dining table, a kitchen cabinet and an ice box, all in one.

Made of 24-gauge galvanized iron, it measures 25 in. long, 10 in. wide and 12 in. high. To the bottom is attached a pair of strap iron clamps which holds the cabinet securely to the running board of any car.

A feature is the false top which unhinges to serve as a table. The drawings show how this stunt is performed. Any kind of wood will do duty here.

You may not like it, but if you want to carry ice you will have to bore a small hole in your running board to take the drain from the ice box. This box should be insulated for best results.

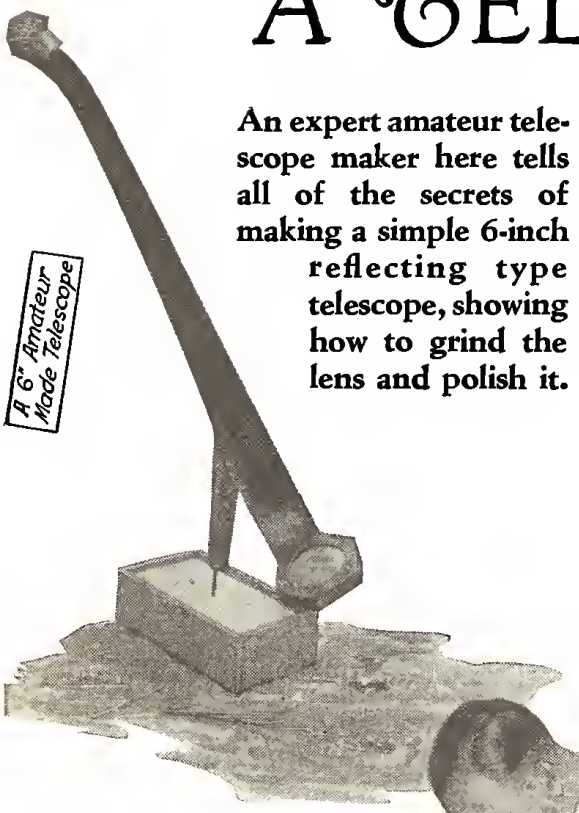
Thanks to the clamp arrangement you can pack the cabinet for the trip, then take it out and fasten it to the running board of your car.



Here's how running board kit opens up for camping duty.

A word of warning to auto campers towing trailers. In most automobile accident insurance policies there is a clause which states that you can't collect on a mishap occurring while you have a trailer hooked on behind. Better check up on this with your insurance company so you'll know just where you stand.

A TELESCOPE *for*



An expert amateur telescope maker here tells all of the secrets of making a simple 6-inch reflecting type telescope, showing how to grind the lens and polish it.

MANY years ago Alice stared into a looking glass that opened up to her a new wonderland, a field of new adventures and delights which had never before been known.

Likewise many years ago, Sir Isaac Newton peered into a new sort of looking glass and entered a land of wonders such as Alice had never imagined. He saw the stars enlarged in a paraboloidal mirror.

Newton's small mirror has since grown to such proportions that the two hundred inch glass which serves as the heart of the world's largest telescope is a monster affair weighing many tons and which required years in the making.

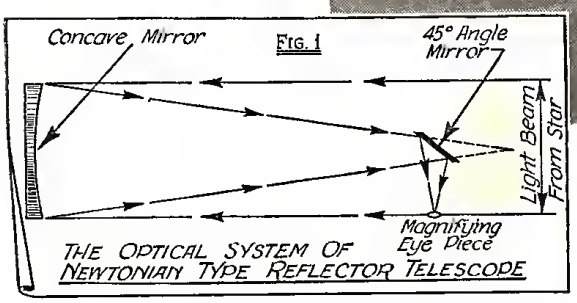
Even Alice herself would find trouble in conjuring up such a mighty glass; but a very good telescope, mirror and all, can be readily made for a few dollars, by anyone who is not all thumbs. With it one may explore the sun, the moon and the planets; bring into view myriads of stars in the Milky Way and a variety of star clusters and nebulae. Jupiter will be enlarged to the apparent size of the moon; and the moon will increase in area thousands of times. For each star that can be seen unaided, a thousand will flash into view through the magic power of this easily constructed telescope.

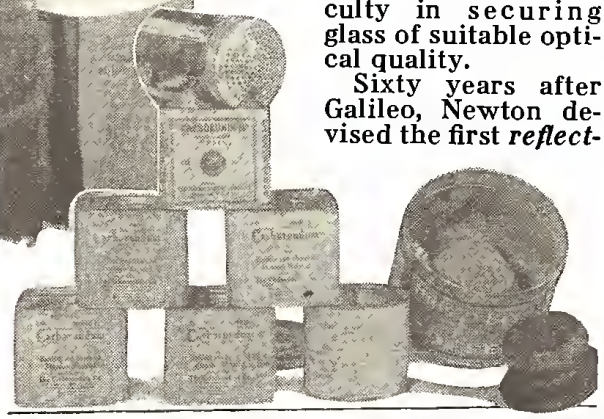
Brief History of Telescopes

In 1609, Galileo, hearing an apprentice to a Holland spectacle lens grinder had discovered that an object viewed through two lenses placed a short distance apart appeared enlarged, constructed several telescopes which had magnifying powers up to thirty-three times.

In the year following construction of this telescope, Galileo began his discoveries. He found sunspots, mountains on the moon and the rings of Saturn. Through the satellites revolving around Jupiter and the fact that Venus showed phases similar to the moon, he proved the Sun to be the center of our solar system. This, the refracting telescope, in which light passes through a lens and forms an image that is magnified by the eye-piece, was and has been limited in use due to color distortion and difficulty in securing glass of suitable optical quality.

Sixty years after Galileo, Newton devised the first *reflect-*





Left above is the telescope which is described in this construction article. Fig. 1 shows the optical principles of the reflecting telescope. A water filled oil drum makes a fine table to work on when grinding the lens. The abrasives may be had by writing the Carborundum Co., Niagara Falls, New York. See accompanying text for specifications.

"STAR GAZING" by E. WILLARD PENNINGTON

ing telescope. This type is free from many of the troubles of the refractor, for the light is reflected from the surface of the mirror and does not pass through the glass. In order to make possible observation of the image formed by the reflector, a plane glass mirror is placed at 45 degrees to the axis of the reflector near the focal point. This diverts the image-forming light rays 90 degrees from their original path and permits viewing of the image at a position to one side of the path of the light rays which are coming to the surface of the reflector. Fig. 1 shows the optical system and light paths of a reflecting telescope of the Newtonian type and the reader should thoroughly familiarize himself with the fundamental principles illustrated before proceeding further. All the large telescopes built in recent years have been reflectors; and the principles used in their construction are identical with the methods followed in making a smaller instrument.

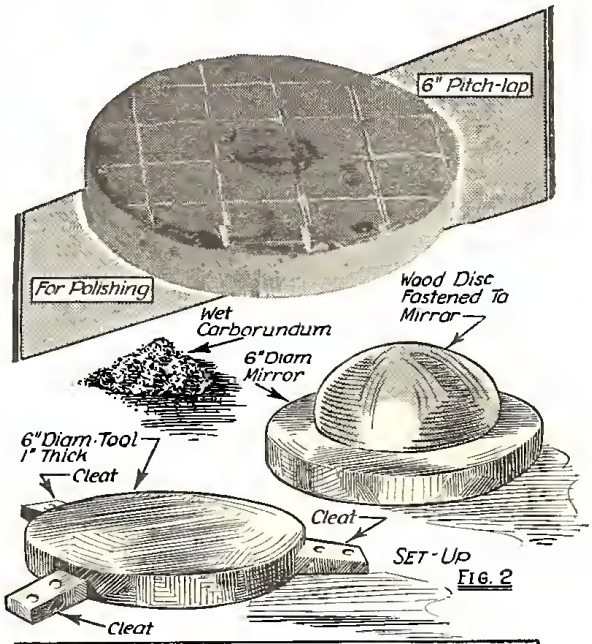
Building a Six-inch Telescope

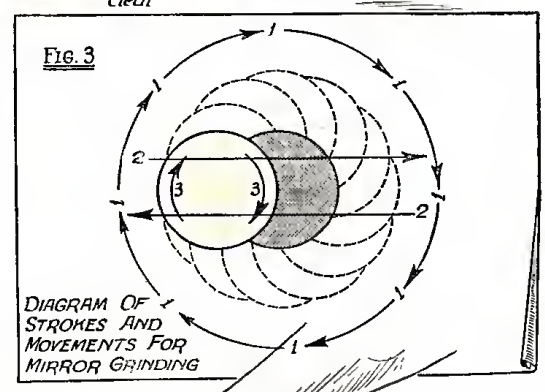
We shall concern ourselves with the construction of a six-inch diameter mirror with a focal length of fifty inches, the rest of the telescope being the eyepiece and a rigid stand or mount that will securely hold the various components in their correct relationship and also allow for easy movement in following the stars along their paths across the sky. With mirrors above six inches in diameter difficulties in the making increase out of all proportion to the gain in size. Therefore, a mirror of six inches diameter is most advisable for the amateur's first attempt.

Materials and Tools

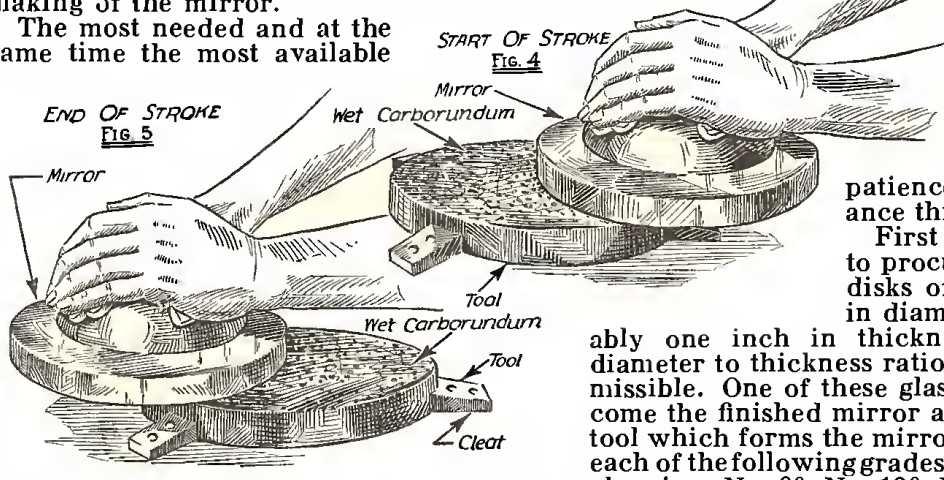
In setting out to make a telescope the beginner should welcome the news that the materials and tools that are required are very few in number and simple in extent —particularly is this true in regard to the making of the mirror.

The most needed and at the same time the most available commodity for the mirror making operation is just plain old fashioned "elbow-grease" with reasonable percentages of patience and perseverance thrown in.





Top photo shows grinding glass prepared for polishing after contour of mirror is cut. Fig. 3 shows grinding motions.



Strokes in Figs. 4 and 5 correspond to strokes 2-2 in Fig. 3. Concavity of the mirror is tested with a template. A "wet" takes from 4 to 6 minutes of grinding.

First it is necessary to procure two circular disks of glass, 6 inches in diameter and preferably one inch in thickness, although a diameter to thickness ratio of 8 to 1 is permissible. One of these glass disks is to become the finished mirror and the other the tool which forms the mirror. A few ounces each of the following grades of Carborundum abrasive: No. 80, No. 120, No. 280, No. 400, No. 600, as well as some No. 6F Turkish emery will be needed. The foregoing will

take care of the roughing out and fine grinding as well as of from four to seven hours of said elbow-grease—applied in spells, of course.

For the polishing is required 4 or 5 ounces of the finest grade of Opticians' Rouge; also about 5 pounds of black Wilmington pitch. Turpentine and generous wads of absorbent cotton fill the bill of materials for the polishing operations. The photo on the first page of this article shows a representative assortment of grinding and polishing materials.

The shaker can facilitates applying an even layer of abrasive to the work and although only one such can is shown in the illustration a *separate one should be provided for each grade of abrasive* as it can readily be understood what a deplorable amount of grief would be encountered in the fine-grinding stages to find scratches on the surface of the mirror due to the fine Carborundum being contaminated by even one or two (one is enough) granules of a coarser grade previously used and not thoroughly cleaned from the shaker. This cleaning, by the way, is hard to do as thoroughly as is needed. Why take a chance? Provide a shaker for each grade and eliminate the possible source of such grief. The turned wooden handle shown in the photo is for gripping the mirror and nothing so elaborate is at all necessary—saw a croquet ball in two and you have an efficient as well as a more comfortable grip.

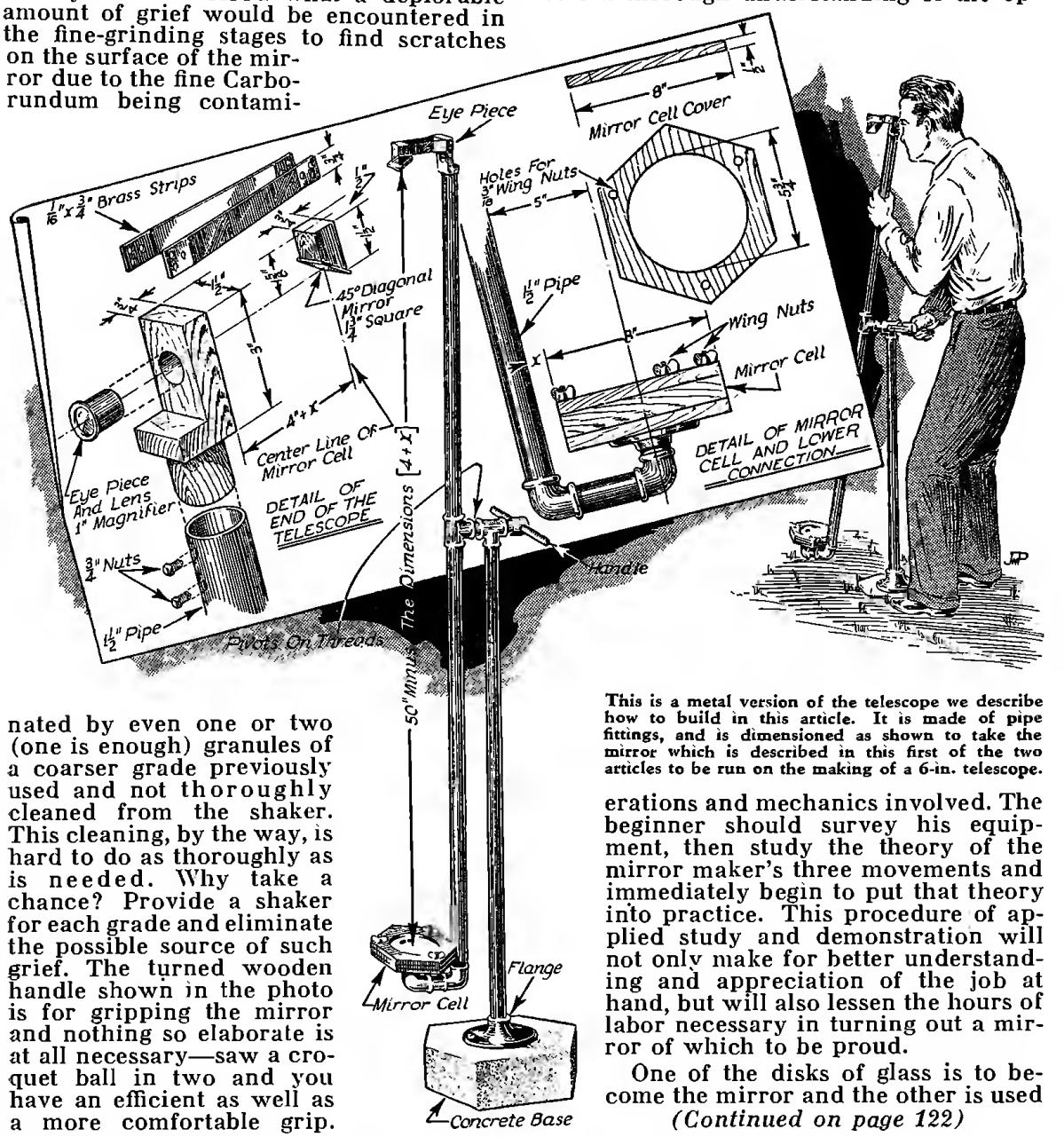
The prime requisite for the working surface or bench at which to perform the mirror grinding and polishing is mechanical solidity and uniformity of temperature. Inasmuch as it is highly desirable that the operator be able to face the grinding job from all directions, one corner of a substantial bench may be used. One form of working foundation for grinding and polishing that is hard to beat is a large oil drum or similar container which can be filled with water to give it all the possible weight and rigidity—and which at the same time allows the operator most easily to circumnavigate the work.

Grinding and Polishing Strokes

In order to do the best and most efficient grinding and polishing job it is necessary to have a thorough understanding of the operations and mechanics involved. The beginner should survey his equipment, then study the theory of the mirror maker's three movements and immediately begin to put that theory into practice. This procedure of applied study and demonstration will not only make for better understanding and appreciation of the job at hand, but will also lessen the hours of labor necessary in turning out a mirror of which to be proud.

One of the disks of glass is to become the mirror and the other is used

(Continued on page 122)



This is a metal version of the telescope we describe how to build in this article. It is made of pipe fittings, and is dimensioned as shown to take the mirror which is described in this first of the two articles to be run on the making of a 6-in. telescope.

Sportcraft for the Bathing Beach



Motive power for the water scooter is the left hind foot. as illustrated at the left. The foot paddles open on power stroke and close when the foot is brought forward. Length of the handle will be determined by your height, as shown.

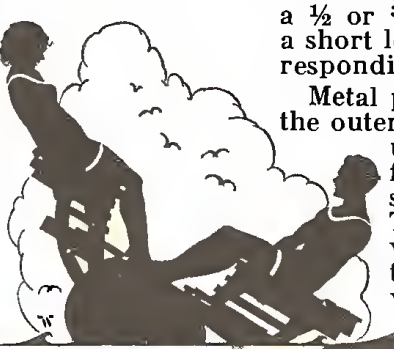
THE simple water scooter shown in the photograph above is buoyant, stable, and easily propelled with the web-like paddle which is attached to the user's foot. The large pontoon is a light but solid wooden framework covered with sheet metal or ¼ in. pine and canvas.

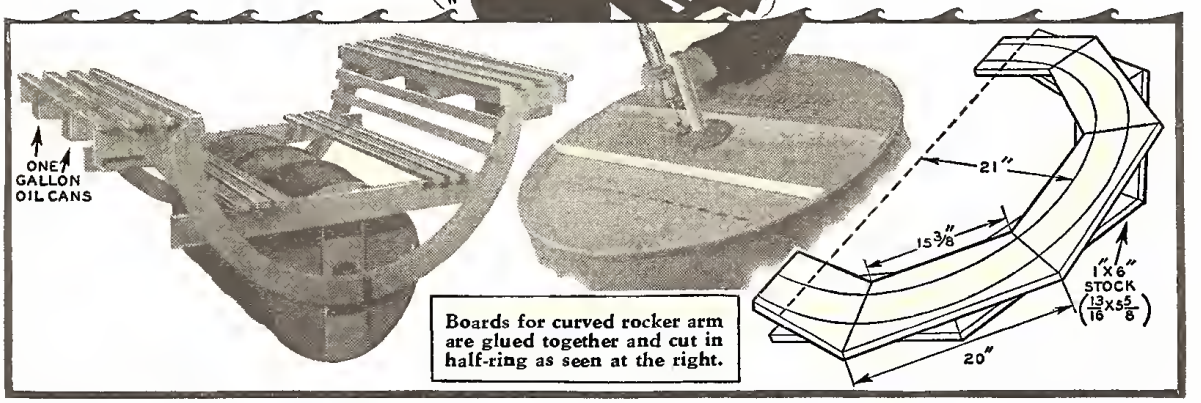
The average dimensions will run about 60 in. long by 17 in. wide by 10 in. deep. The paddle, shown in the photograph above, is simply an arrangement of three ½-inch thick boards, coupled together with leather straps or small hinges, and so arranged that the paddle will open flat on the power stroke and close up as the foot is brought forward. Cover the footboard with some rubber matting to prevent slippage.

There's fun for the whole family in the novel water rocker shown below. You can easily build up the curved rockers from 1 in. stock, as shown in the diagram. The floating unit is a standard oil drum.

Into the recess in each end of this is fitted a length of 1 in. stock 6 in. wide which is screw-fastened to the drum at the edges. In the center of the cross piece is fastened a ½ or ¾ in. floor flange coupled to a short length of pipe which fits corresponding holes in the rockers.

Metal plates should be screwed on the outer side of the hole to hold the unit in place. An important feature is the 3 1-gallon cans strapped under each seat. This added buoyancy prevents the whole unit from turning completely over when not in use.

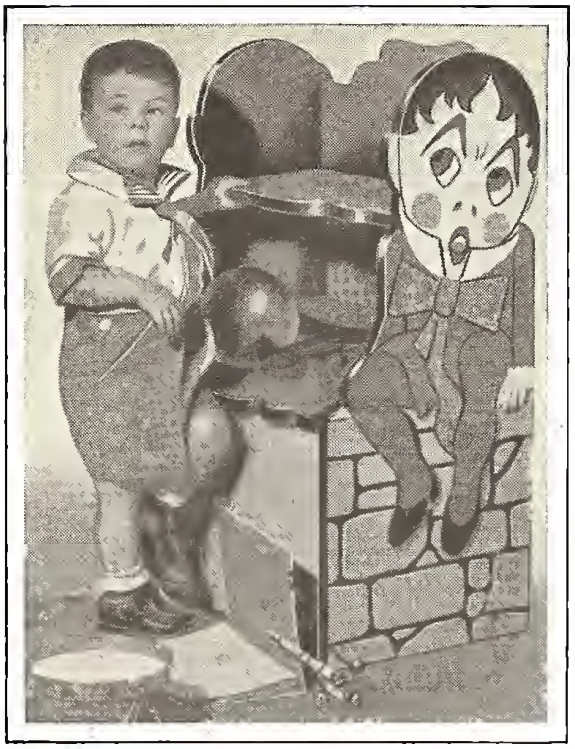




Boards for curved rocker arm are glued together and cut in half-ring as seen at the right.

Water action has see-saw action, seats being buoyed up by the three one-gallon oil cans fastened underneath. Center photo shows how the flange plate is attached to the center board to take shaft which passes through the curved rockers.

Ornamental Cabinet Holds Junior's Toys



Build this toy cabinet for junior and the question of what to do about toys scattered over the floor will be disposed of.

HUMPTY Dumpty, precariously perched on his wall, solves the problem of teaching the youngsters to pick up their toys when they are through playing with them. His roomy cabinet affords storage space for many playthings.

This cupboard is a jigsaw and bandsaw project, yet easily enough made by hand. The ends, shelves and doors may be glued up from solid pine, but five-ply stock is much more satisfactory.

The body of Humpty, including the collar and hand, but minus the arms and thumb, is made from ¼" three-ply. Hang the doors with 1½"x1½" butt hinges. If they are of solid wood, back them with cleats to prevent warping.

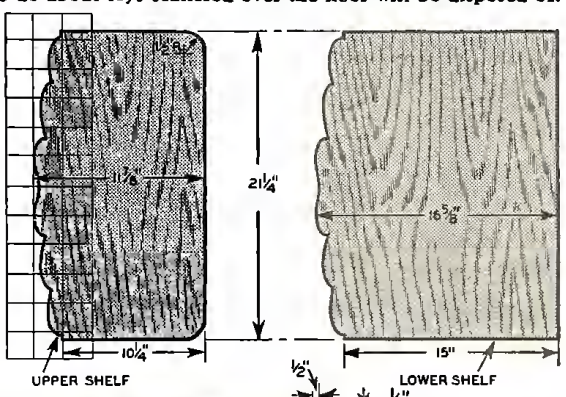
Cut the mortar joints in the wall with a gouge pushed with a twisting motion, leaving the cuts rough. Outline the overlays with a ⅛" veining gouge, or with a machine router. Similar treatment of the head heightens the finished effect.

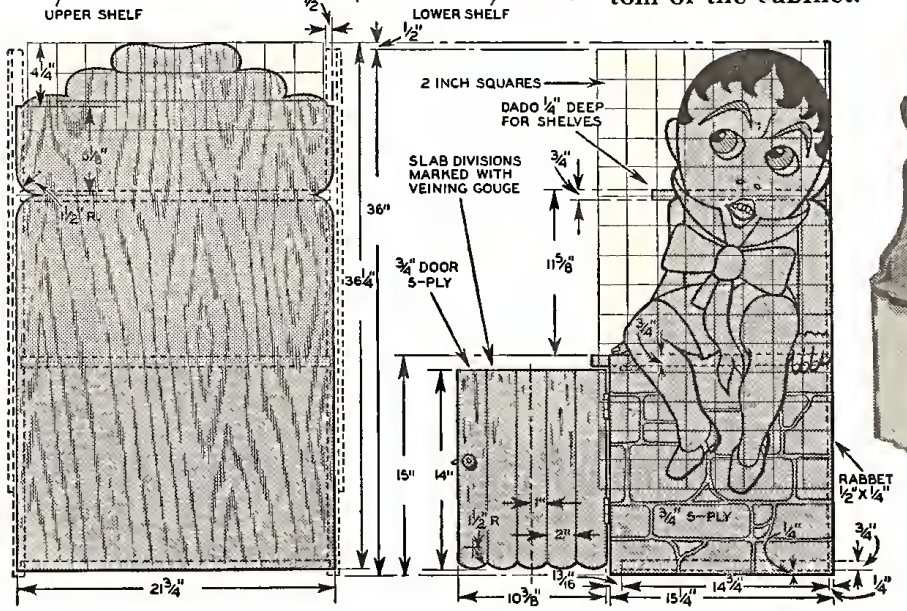
Paint the stones, except in the overlay space, with yellow, and black the edges of the overlays, before gluing and tacking them in place. Paste red cambric on the coat parts, and green on the legs, preferably using stainless casein glue.

Figured cretonne with a blue ground is good for lining the shelf spaces. A coat of clear varnish on this lining, as on the clothes of the little man, makes the fabric more durable, and easy to clean with a damp cloth.

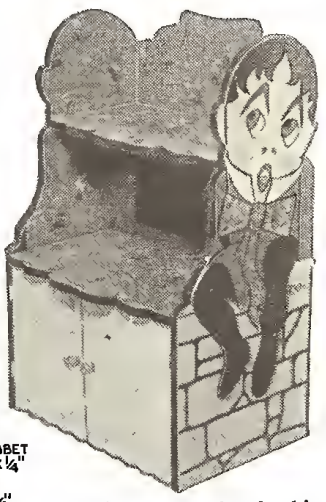
As a final touch in the painting, outline the head and body with black paint applied with a fine round brush.

Fit the doors with knobs and snap catches, and drive metal glides into the bottom of the cabinet.





Details of cabinet construction. Make patterns by dividing strips of wrapping paper into two-inch squares, through which the outlines are sketched. Tack pairs together for machine work.



Here's the completed cabinet. Figured cretonne with blue ground is good for lining the shelf spaces. Outline the head and body with black paint applied with a fine round brush.

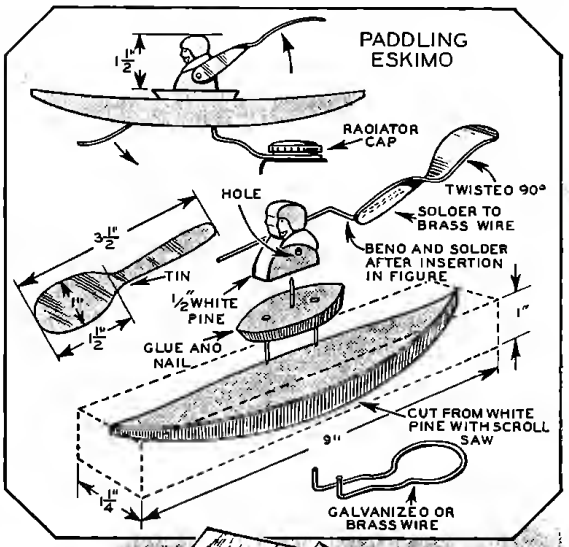
Profit-making Shop Sales Are Appealing

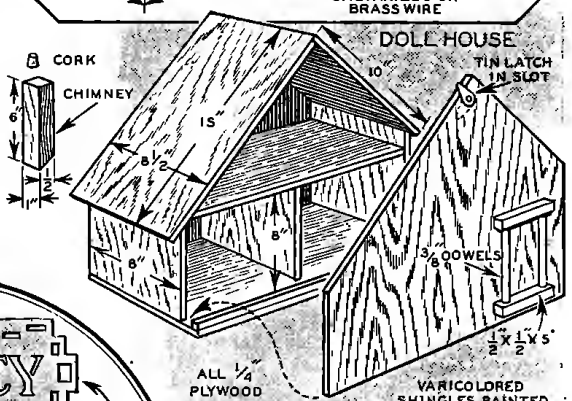
SPRING is the time of opportunity for the shopman, for then he can turn his talents to profitable use. Illustrated on this page are a number of workshop projects which have an appeal to almost everyone, and which will, therefore, have a wide market.

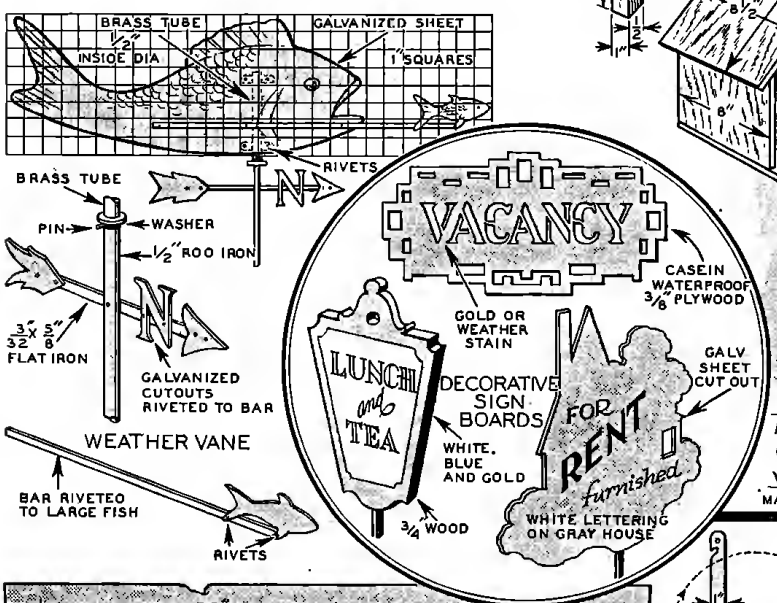
For instance, a motorist with a sense for the unique and decorative will welcome the little paddling Eskimo illustrated at the right. The cost of the materials is negligible, but the product will be valuabe because of the workmanship going into it.

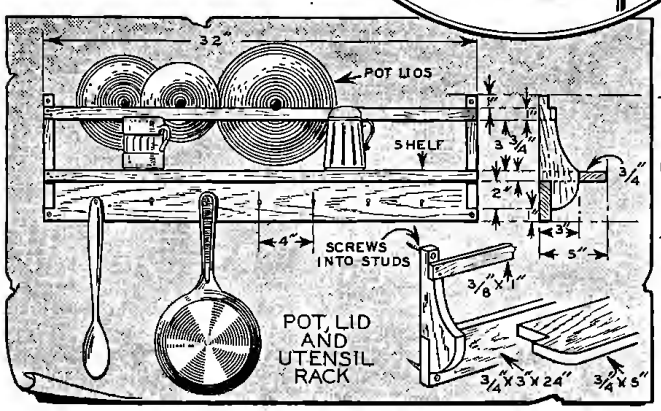
Housewives are always on the lookout for little gadgets that will make their lot in life easier, and for that reason the utensil rack and the sliding clothes line rack will prove a moneymaker. The dimensions of the rack, if need be, can be altered for individual requirements.

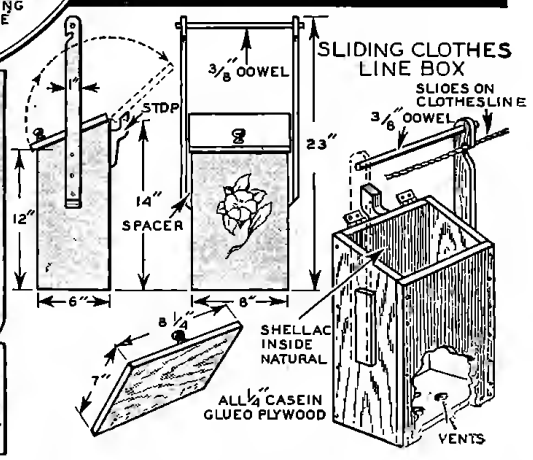
The wisest way to handle the decorative sign boards is to survey your territory for vacant houses, apartments, or rooms, and then approach the owner with your product. He will be able to appreciate its merit without much argument. Likewise with the lunch and tea sign.





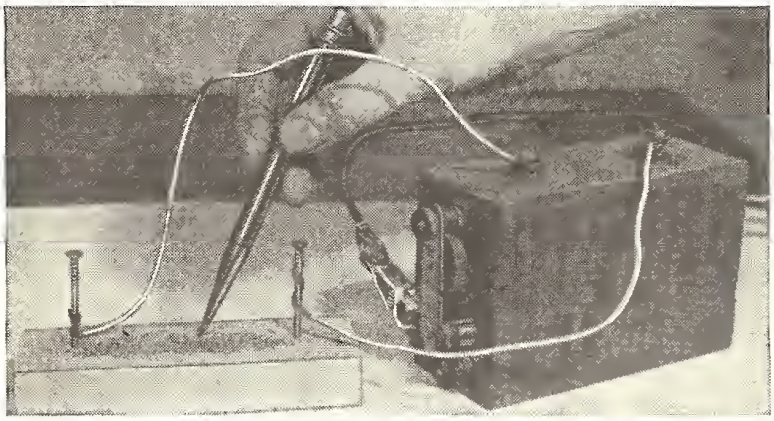






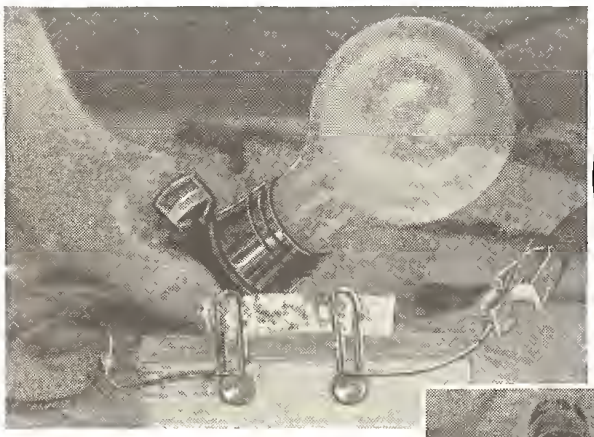
When mounted on radiator cap, paddling Eskimo, shown in drawing at top, whirls his paddle as if he were really going places. The weather van always swings about so that big fish is chasing little fish in direction from which wind is coming. Contracts can be taken to build utensil racks for individual requirements, but for general use the dimensions given will suffice.

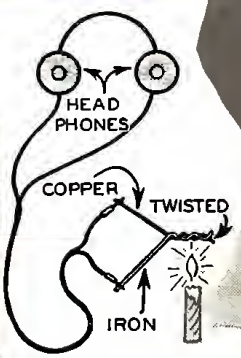
Fascinating Stunts Teach ELECTRICITY



You'll see a fascinating display of electrical fireworks when you hook up an old Ford spark coil to a couple of nails. Iron fillings, sprinkled between nails, sparkle brilliantly.

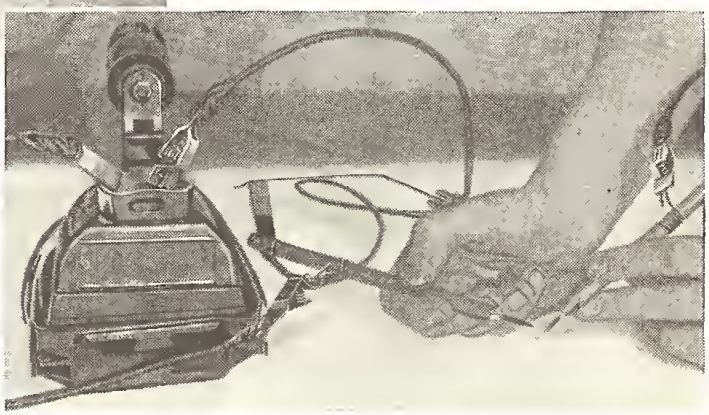






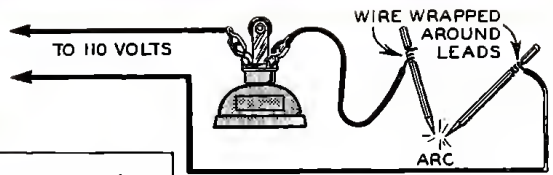
Principle of the thermocouple is illustrated when you twist a copper and an iron wire together and heat the joint over a flame. Tips of headphone cords touched to wires show current is flowing by loud click. Heat generates the "juice."

The function of a fuse may be studied by hooking strip of tinfoil in 110-volt circuit as shown. Turn on light—pfssst goes the fuse.



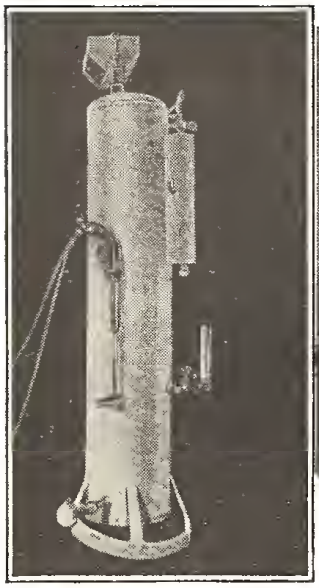


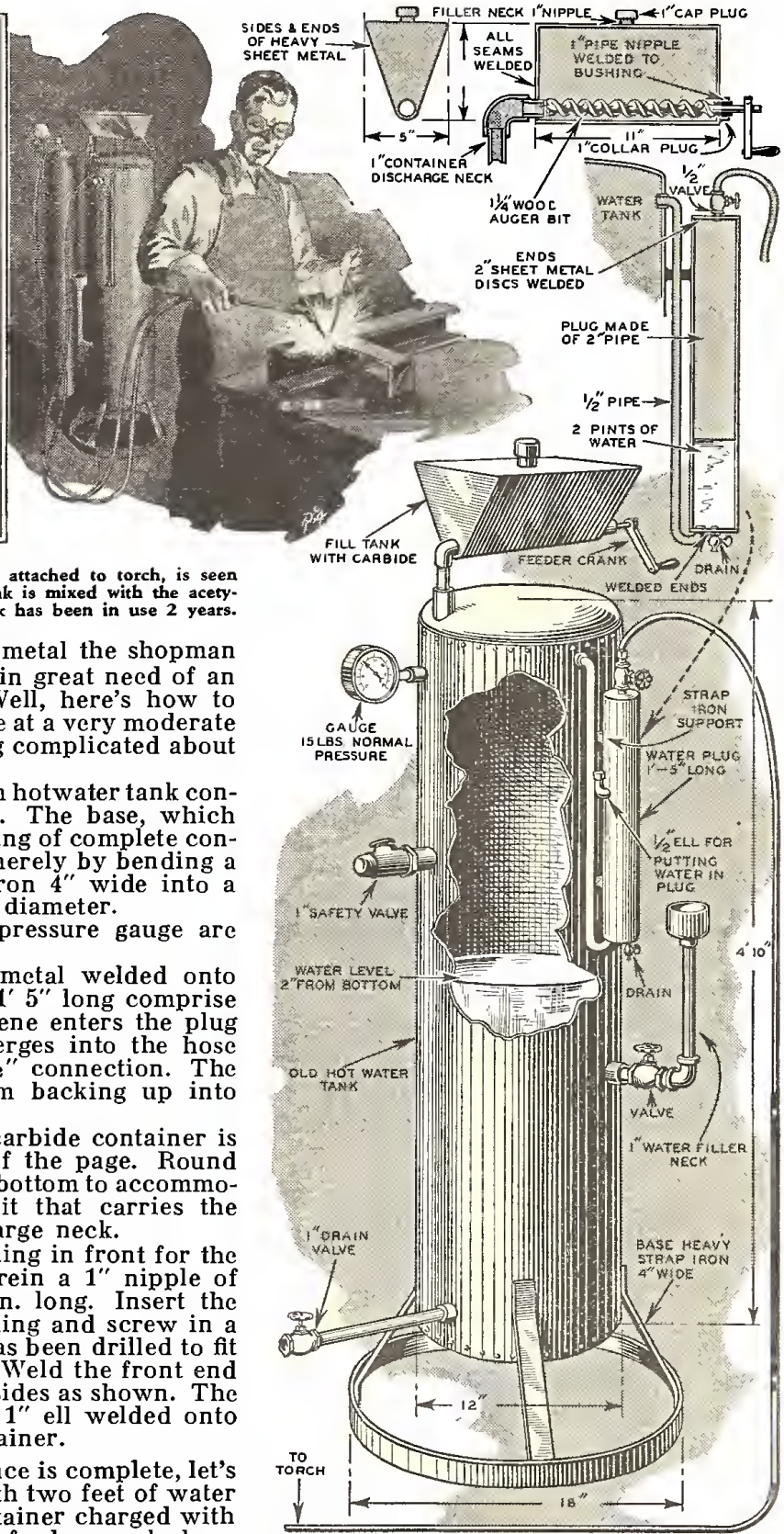
More fireworks. Aluminum powder, which comes with aluminum paint, is blown into a flame with a glass tube or straw as illustrated here. The small particles burn like myriads of shooting stars. Try this stunt for some startling entertainment.



Two lead pencils and iron hooked up as illustrated show how an arc light works. First touch leads together, then separate slightly to start the arc.

Acetylene Generator for Shop Welding Jobs





Completed generator, with hose attached to torch, is seen above. Oxygen from oxygen tank is mixed with the acetylene gas at the torch. This tank has been in use 2 years.

WHEN working with metal the shopman often finds himself in great need of an acetylene generator. Well, here's how to build a very efficient one at a very moderate cost and there's nothing complicated about its construction.

An ordinary bathroom hotwater tank constitutes the water tank. The base, which may be viewed in drawing of complete contrivance, was devised merely by bending a heavy piece of strap iron 4" wide into a complete circle 18" in diameter.

A safety valve and pressure gauge are almost indispensable.

Two discs of sheet metal welded onto each end of a 2" pipe 1' 5" long comprise the water plug. Acetylene enters the plug at the bottom and emerges into the hose at the top through a ½" connection. The plug prevents fire from backing up into the tank.

Construction of the carbide container is illustrated at the top of the page. Round the ends slightly on the bottom to accommodate the 1¼" auger bit that carries the carbide into the discharge neck.

After cutting an opening in front for the feeder-crank, weld therein a 1" nipple of the all-thread type 2 in. long. Insert the auger through the bushing and screw in a 1" collar plug, which has been drilled to fit the bit, on the nipple. Weld the front end of the container to the sides as shown. The carbide discharge is a 1" ell welded onto the bottom of the container.

Now, as the contrivance is complete, let's get her into action. With two feet of water in the tank and the container charged with carbide, manipulate the feeder-crank slowly until the pressure gauge registers about fifteen pounds. Finally hook up the torch.

All necessary details of generator are shown above. Turning feeder crank forces carbide through discharge neck and into the water tank, where pressure is generated.

How to Build an Electric Guitar



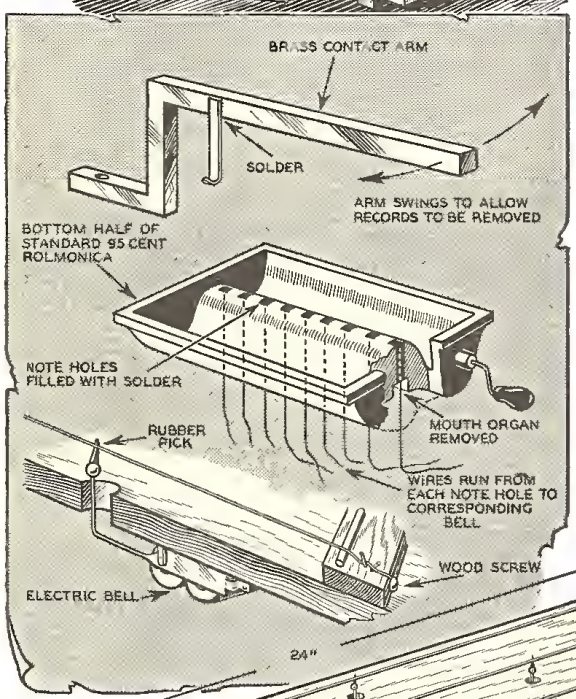
THIS guitar is a player guitar operated by electricity. It is made of very simple elements and when done will play any of the Rolmonica harmonica records, such as Turkey in the Straw, Blue Danube, and others by simply inserting the record as you would in a Rolmonica, or player mouth organ, and turning the crank.

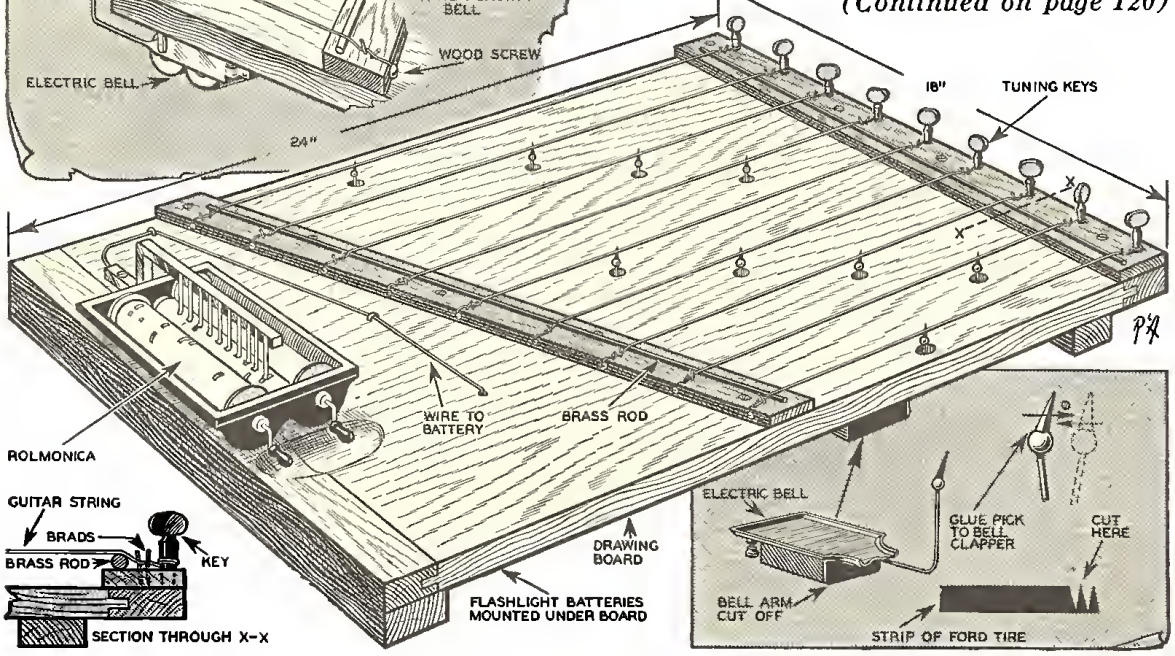
The materials needed are: one 95c Rolmonica, which can be procured from any music store or mail order house, one 18"x 24" drawing board, ten chromatic guitar strings (10c each), ten ten-cent tuning keys such as are used in ukeleles, one hot shot dry battery, and ten Kresge doorbells of the 25c variety. Four or five dollars will buy all the equipment needed to make the Player Guitar.

The first operation is to remove the mouth organ from the Rolmonica. Then the instrument is placed face down on a flat surface and thin copper wire, one strand to a hole, is leaded in by punching in lead filings into the holes around the wires. When the filings are in, a touch with the soldering iron will amalgamate the metal and produce a smooth tracking surface without danger of fusing the formaldehyde composition which the Rolmonica is made of.

Then the drawing board is taken in hand, and laid out for the hardwood bridge and the tuning keys. When the board has been marked to show exactly where every string

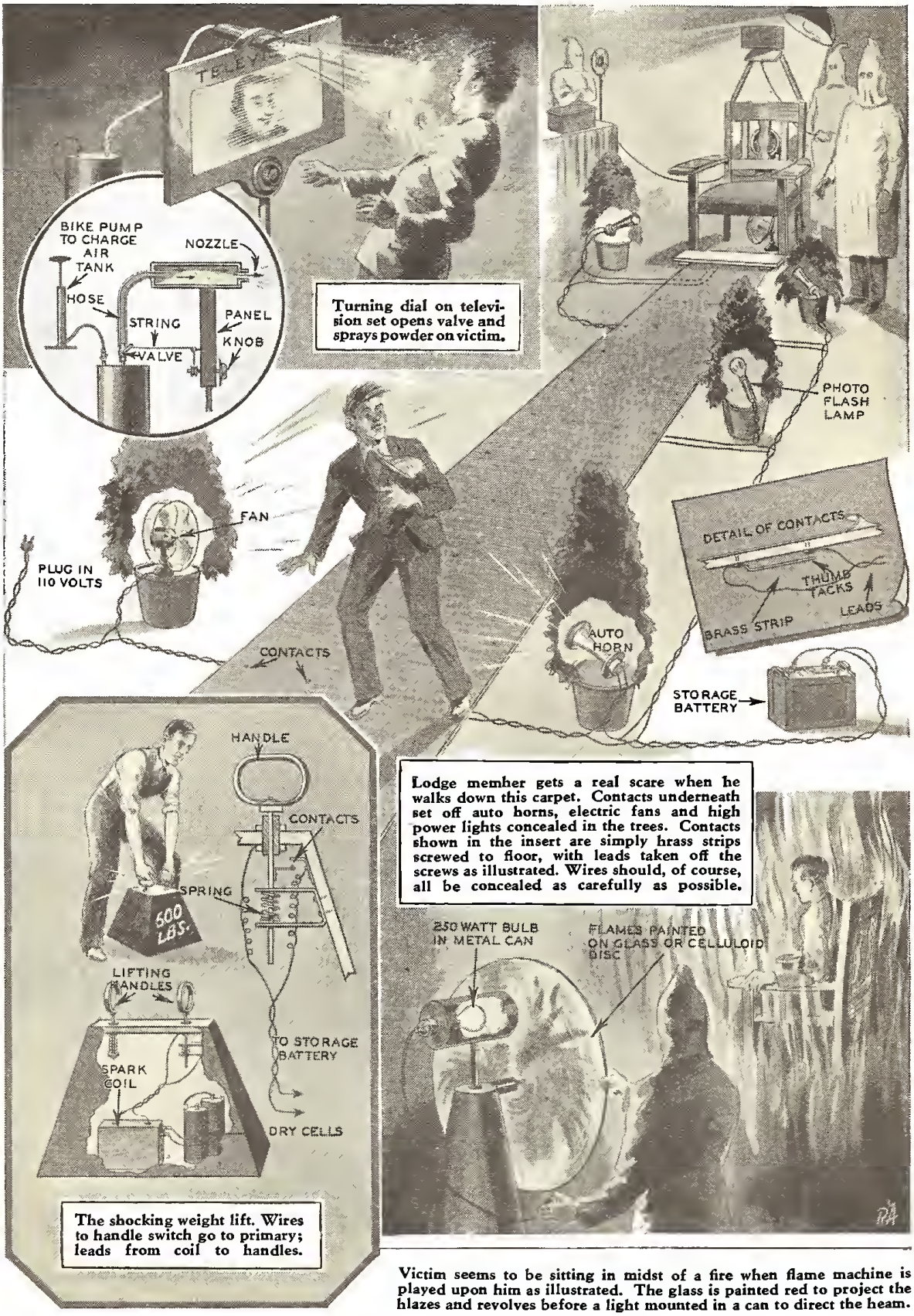
(Continued on page 120)





This guitar will play automatically by electricity from rolls run through an electrified Rolmonica mouth organ. The details of the bridge and mounting the bells are clearly shown in the drawings.

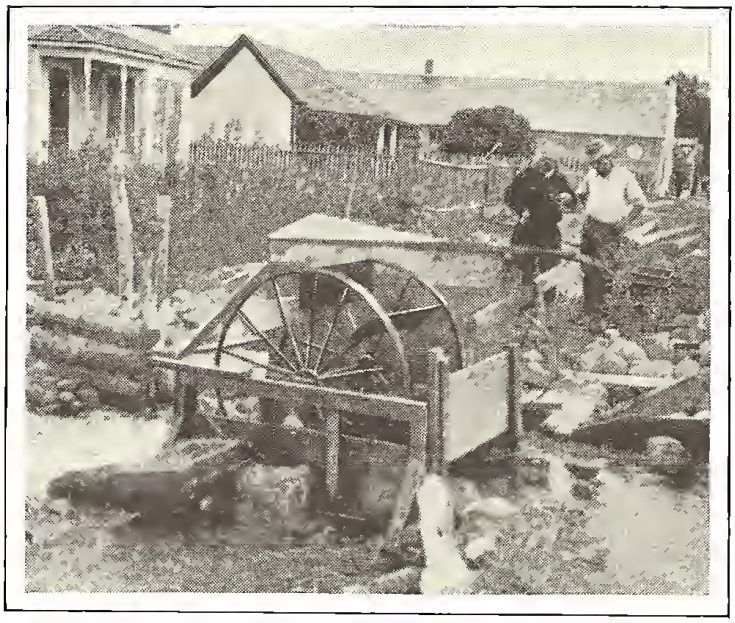
"Shocking" STUNTS for Lodge Initiations



Victim seems to be sitting in midst of a fire when flame machine is played upon him as illustrated. The glass is painted red to project the blazes and revolves before a light mounted in a can to direct the beam.

HOME MADE Water

Widespread interest among readers concerning building of water wheels unearths this unique adaptation of old farm implements which is floated in place, sunk with rock, giving an undershot wheel of ½ h. p.



Two Montana readers of Modern Mechanix and Inventions show how they meet the problem of extracting power from a nearby stream.

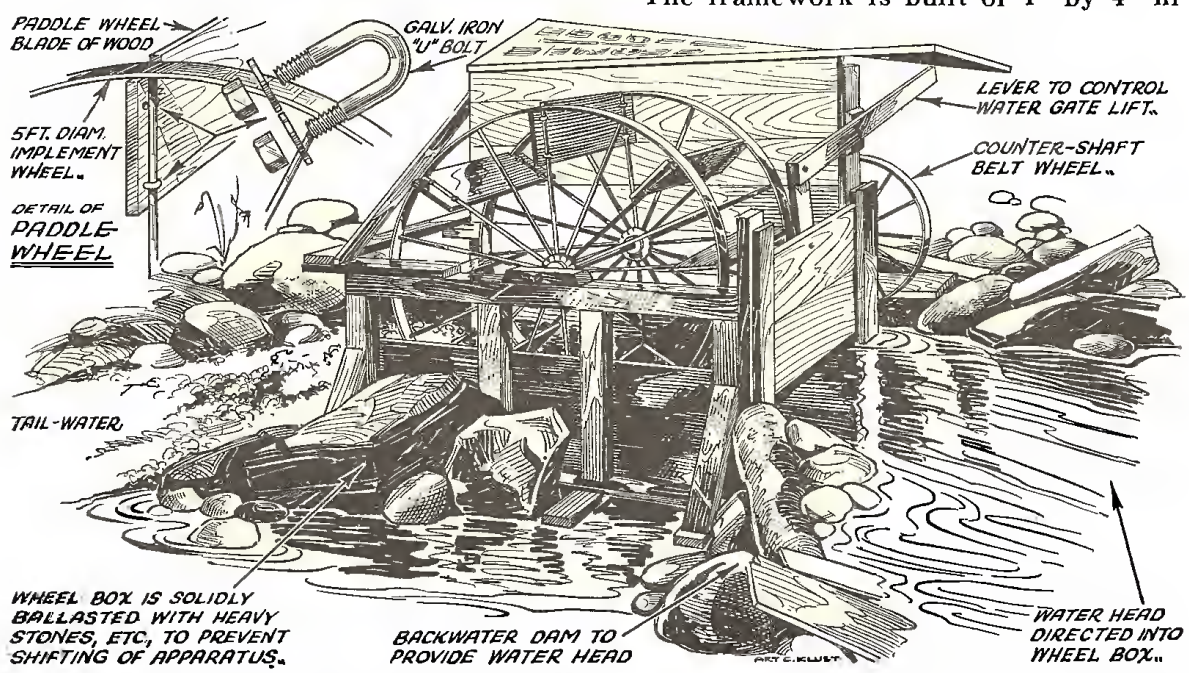
MANY readers of M-M live in communities in which a stream of some sort winds its turbulent way. For a long time we have been referring querents to manufacturers of small water power equipment, and finally we ran an article by John S. Carpenter, hydraulic engineer, on the making of an overshot wheel. This was a real little job, capable of about 1 h. p., and was highly popular with our readers. Mr. Carpenter has other projects afoot, of which more anon.

Two readers out in Montana have built an undershot wheel which captures some of the latent power in a local stream that was formerly going to waste.

Their version of the wheel is interesting and, though it may not be technically so flawless as Carpenter's design, it is well worth the running to stave off the flood of correspondence we have been receiving anent an undershot wheel.

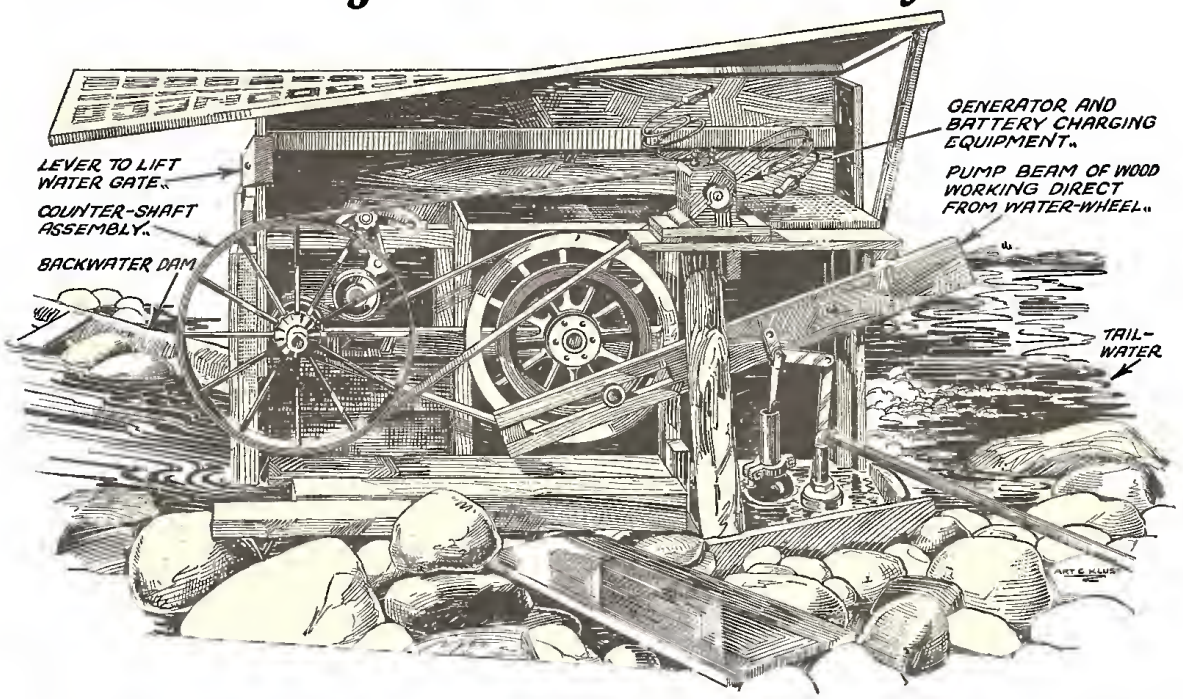
This home-made job has all the earmarks of hard boiled practicality. It is built in a shop out of odds and ends and then is lowered into the bed of the stream, anchored by a crib work of rocks, and forms the foundation for the dam itself, for timbers are then led ashore from the sides of the crib, and riprap rock thrown in with dirt and soil to impound the water to a sufficient height and to lead it into the wheel.

The framework is built of 4" by 4" fir



This shows how the crib is made, how the cultivator wheels are made into undershot paddles, and how the washboard keeps the water from splashing on the machinery. The warped piece of metal is simply an old sign propped in place to keep rain off the working parts such as belt, dynamo, and the countershaft.

Wheel Gives One-half H. P.



This shows working side of wheel. An old auto wheel rim is belted to counter shaft assembly (made from old farm wagon wheel). This is belted to a 350-watt generator. A pinion in a slot gives a pump action to a household pressure pump.

posts. One side is left open, and the other side of the framework is sheathed up so that this shore side of the wheel, on which the pulleys and the driven machinery are housed, shall not be subject to all the splashing which the wheel throws about. An old tin sign is hung over this machinery to further shield it from rain. Water, you know, is injurious to belting.

The framework has legs which are braced outwards on which rock can be piled to anchor it solidly.

The water wheel itself is made from two wheels taken from an old cultivator or hay rake. These wheels are of the metal variety, and with U bolts as shown in the detail on the accompanying drawing the cypress boards (six in number) are fastened to the spokes. The edges of the boards near the ends are notched down to bring the paddle edges flush with the outer rim of the wheel.

Ordinary wooden blocks of hardwood are the bearings, and on the machinery side of the wheel the axle runs through the sheathing and in any convenient manner is fastened to an old auto wheel. The beam on which this bearing rests for the driving shaft is also the beam which carries another bearing for a counter shaft. The front wheel of an old farm wagon in this instance made a fine counter pulley and a belt was led from its rim to a 350 watt d.c. generator, which some distance away charged a shelf of batteries.

The wheel was also made to pump water for household needs in the following manner.

An auxiliary face or rim wad screwed onto the spokes of the auto wheel, and a pinion for a scotch slide was bushed in. The slide was pivoted at the other end of the frame, and a series of compensating yokes was put into play on the business end of a force pump. The water for the pump was taken from the headwater, this being the clearest.

The delivery was piped to a gravity tank where it was impounded for further use.

A sliding gate was put into the crib at the headwater. This was used to regulate the speed of the wheel, and the delivery of current and water.

It is estimated that the wheel delivers about ½ h. p. as it drives a 350 watt generator (746 watts equals a horsepower), and also has "steam" enough to pump water besides.



A lever to the inlet gate controls speed of the water wheel.

Unique Model AIRPLANE

Sitting in "cockpit" of this model plane, your hands grasping the "stick" and your feet on the rudder bar, you can take off and land, ascend or descend and bank to right or left as if you were in a real plane. A complete flying course turned out right in your own workshop.

by **PAUL R. RANNIE**

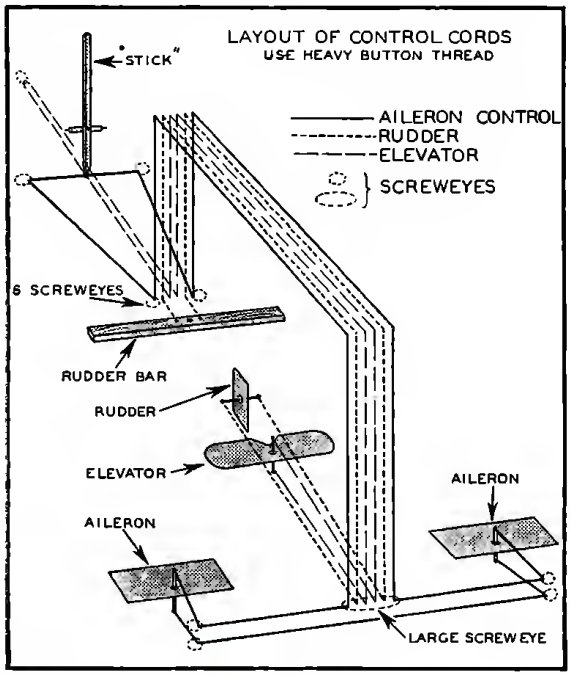


Fig. 1. Hook up your control threads as illustrated here. Note thread to control elevator goes through eye under seat.

WHILE this small airplane will not fly through the air by means of a rubber band motor like the usual model airplanes, it will do things that flying models will not do. It can be maneuvered like a real plane with controls operated in the same manner as those on a real plane.

Pull back on the "stick" and the nose of the model goes up and the plane climbs. Push the stick forward and the plane goes down. Side motion of the stick will bank the plane to the left or right. A rudder bar on which the feet are placed turns the plane from side to side.

All of this is accomplished without the plane moving forward because an electric fan is used to furnish a stream of air. The plane rises from the floor because it is suspended from the end of a balanced lever arm.

The construction will not be found difficult and no special materials such as balsa wood, special paper for wings, etc., are needed.

Construction is illustrated in the drawings. The fuselage is an ordinary piece of wood 12" long. The wing and tail are made of ordinary cardboard. Make the wing perfectly plane, but adjust the ailerons so that both are tipped down a little. This adjustment gives a little better lift. The tin propeller which spins around in the air stream has no function except to give a realistic appearance.

When the plane is suspended by the control cords, the lead weights should balance

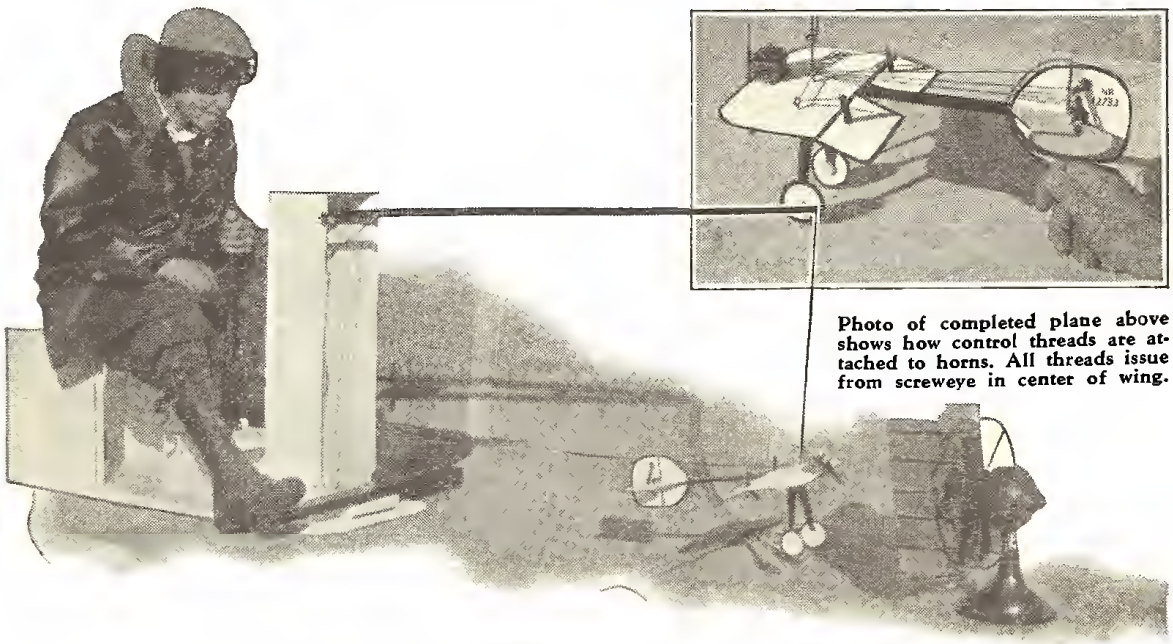


Photo of completed plane above shows how control threads are attached to horns. All threads issue from screweye in center of wing.

The model plane in action. The youthful pilot manipulates ailerons, rudder and elevator as if he were sitting in cockpit of real plane. Note that the fan has a cardboard grid to direct straight stream of air against controls of the plane.

Teaches You HOW to FLY

it so the tail is slightly lower than the nose. The plane is less stable and banks easier if the weights are raised about ¼" above the wing.

Stability is increased by placing some of the weights below the wing. The center screweye which supports the plane and through which the 6 control cords pass should be no more than 2¼" from the front of the wing. Otherwise the plane loses stability.

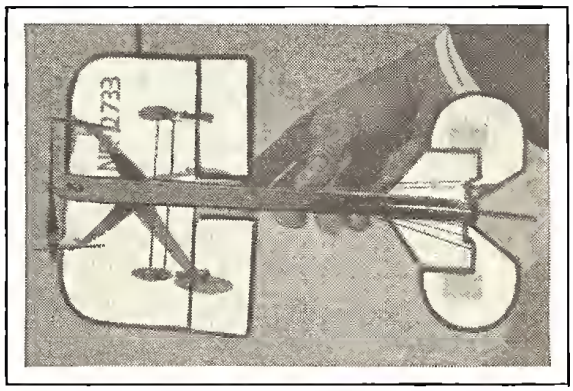
The wing span may be greater than 8" if a large electric fan is used.

To fasten the horns to the ailerons, etc., simply punch a hole through the cardboard, push the horn through and put some glue around the hole.

When constructing the tail, first cut the slot in the fuselage for the vertical stabilizer or fin and glue it in place. Next glue on the two halves of the horizontal stabilizer and attach the elevator. Then mount the rudder with the stove pipe wire as shown.

When folding the cardboard to form the hinges on the tail piece, use a wire or rod larger than the wire that is to be used as a hinge pin when assembled. This will make the hinges work freely. If you paint the model, don't get paint in the hinges.

The control section needs little comment. The lever arm which extends out in front is pivoted on a large wire about No. 10 size. The lever arm is counter-balanced by tin cans filled with sand or scraps of iron. Note the looped wire that is fastened between



Underside view of the plane shows how the tin landing gear is attached to the wood fuselage. Thread from lower horns of ailerons pass through screweyes under the wing.

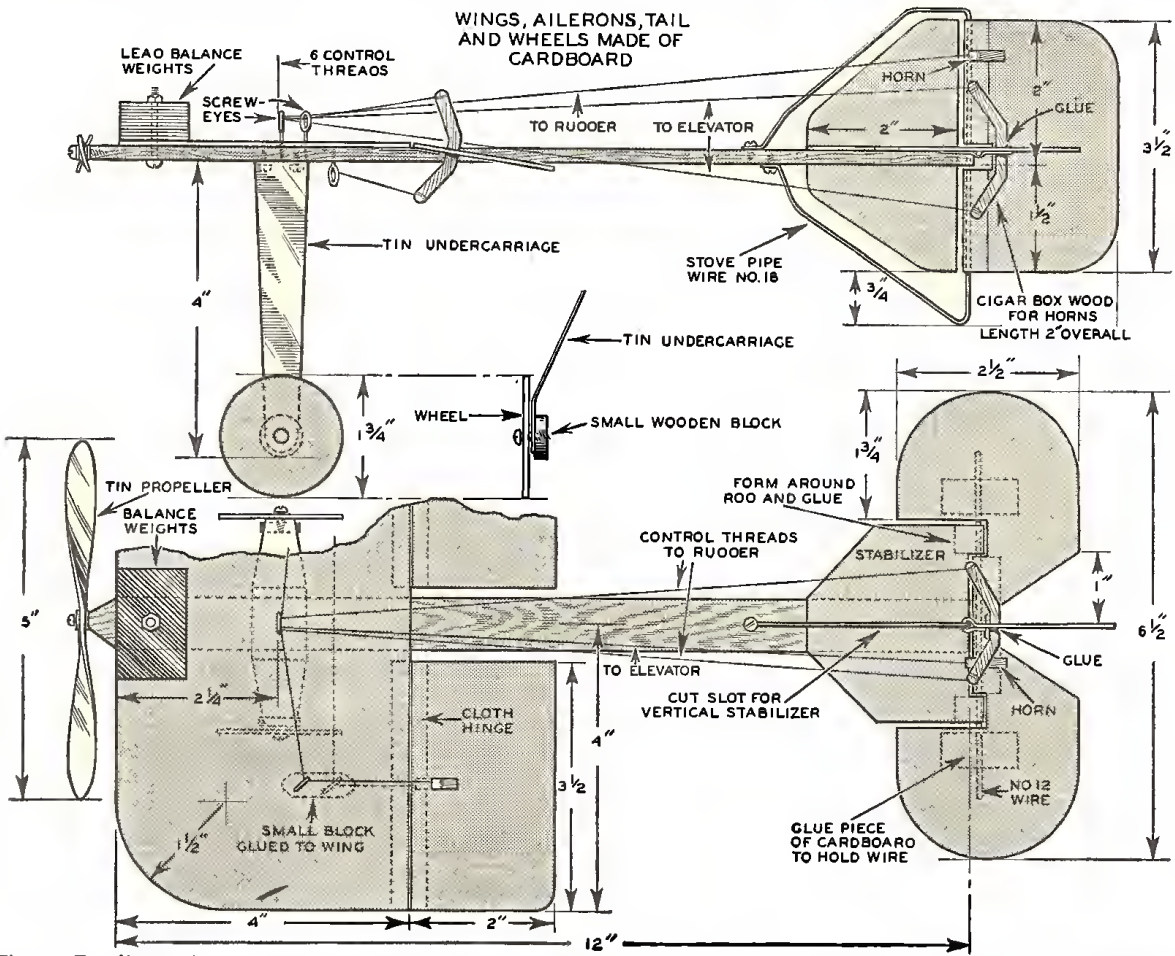
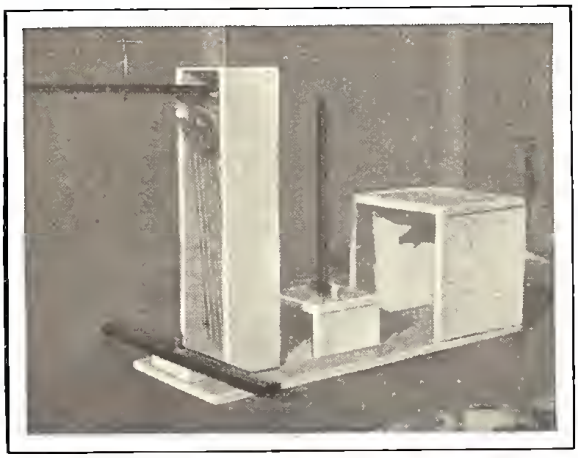


Fig. 2. Details of plane construction will be found here. Wood fuselage must be slotted to take the vertical stabilizer. The ailerons, attached to wing with cloth hinges, should have a slight downward slant. Rudder extends below fuselage.



The control section is shown above. The arm which supports the plane is counter-balanced with two buckets of sand.

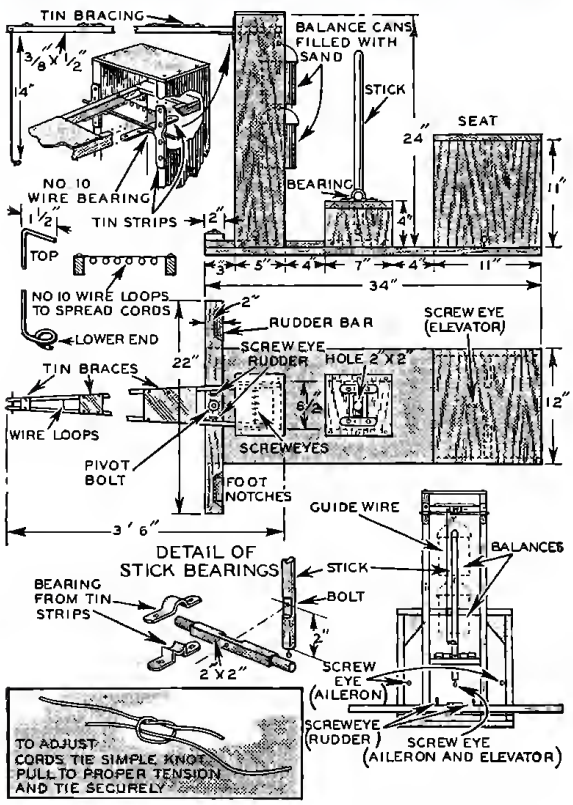


Fig. 3. Details of control section. Make it a point to keep control cords well spread by means of wire loops and screweyes.

the two sides of the arm near the small end. This keeps the control cords spread and reduces the friction. At the end of the arm the control cords pass over another heavy wire which also serves as a guide for the cords which pass through a loop at its lower end.

The control cords, which are heavy button thread, are installed as illustrated in the drawings. Note that the ailerons are connected together by a cord through the screweyes under the wing. As mentioned before, both ailerons should be slightly depressed when in normal position. The tension of all control cords should be about the same so that the plane is supported equally by all of them.

The electric fan may be any size down to an 8" fan such as shown in the photographs. However, it must have a grid work, made of cardboard, as shown in the photographs, on the front of it to direct the air in straight lines. The openings in the grids should be about 1¾" square and about 2½" to 3" deep. Ordinarily the wind from an electric fan has a whirling motion and the plane will not fly in it.

Place weights in the cans to counterbalance the plane until it almost rises from the floor. It is a good idea to have a small weight on the arm as the clamp shown in the photographs for fine adjustments of balance. The fan should be about 6" in front of the plane.

Some suggestions for flying the plane are as follows: First raise the plane to the level of the center of the fan and wedge the arm to keep it from moving up or down. Then turn on the fan and try out the controls and balance or adjust the plane if necessary.

You can learn a great deal about the control of the plane in this manner. Banking the plane to any large amount is best studied with the arm fastened in one position. Raise the weights on the plane as mentioned before to make the plane less stable. Then you will be able to turn it over on its side. You will note how the action of the rudder and elevator is reversed when a plane is banked steeply.

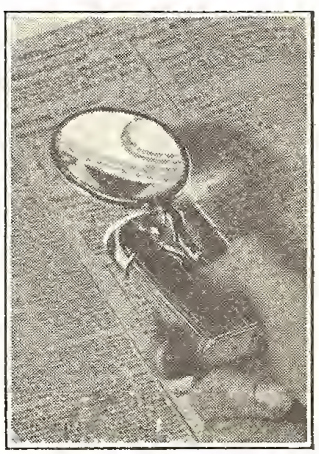
It is a good plan, after the principles of the control are learned, to keep the eyes off the tail of the plane and watch the nose. That is how a real pilot flies. He judges what his plane is doing by how the nose appears against the horizon.

After learning the use of the controls, remove the wedge that holds the arm and allow the plane to rest on the floor. You may have to raise it up a little on a pile of

(Continued on page 126)

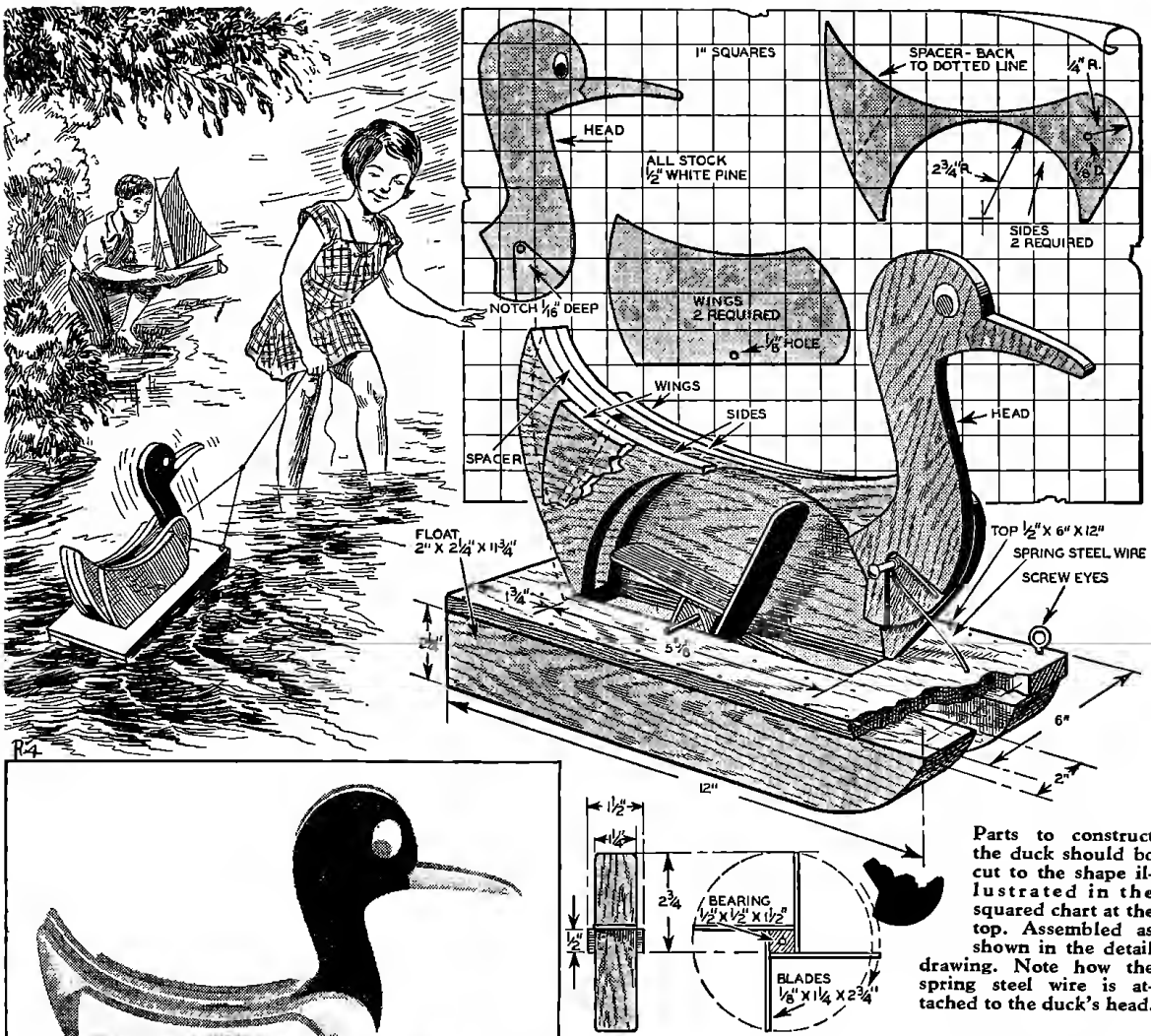
Flashlight for Difficult Reading

A VEST pocket size combined flashlight and reading glass concentrates its light on the spot directly below the powerful glass. When not in use, the glass folds back compactly against the body of the light. It can be used to advantage in studying fabrics, old manuscripts, fine printing, and delicate etchings.



Flashlight illuminates the reading matter while glass magnifies.

Wooden Duck Bobs Its Head as if Alive



Completed water duck, seen in this photo, bobs its head in a fascinating manner when it is pulled through the water. One of the paddles strikes the head piece to cause bobbing.

Parts to construct the duck should be cut to the shape illustrated in the squared chart at the top. Assembled as shown in the detail drawing. Note how the spring steel wire is attached to the duck's head.

PULLED through the water by means of a simple draw string, this amusing water duck will bob his head in a quaint manner.

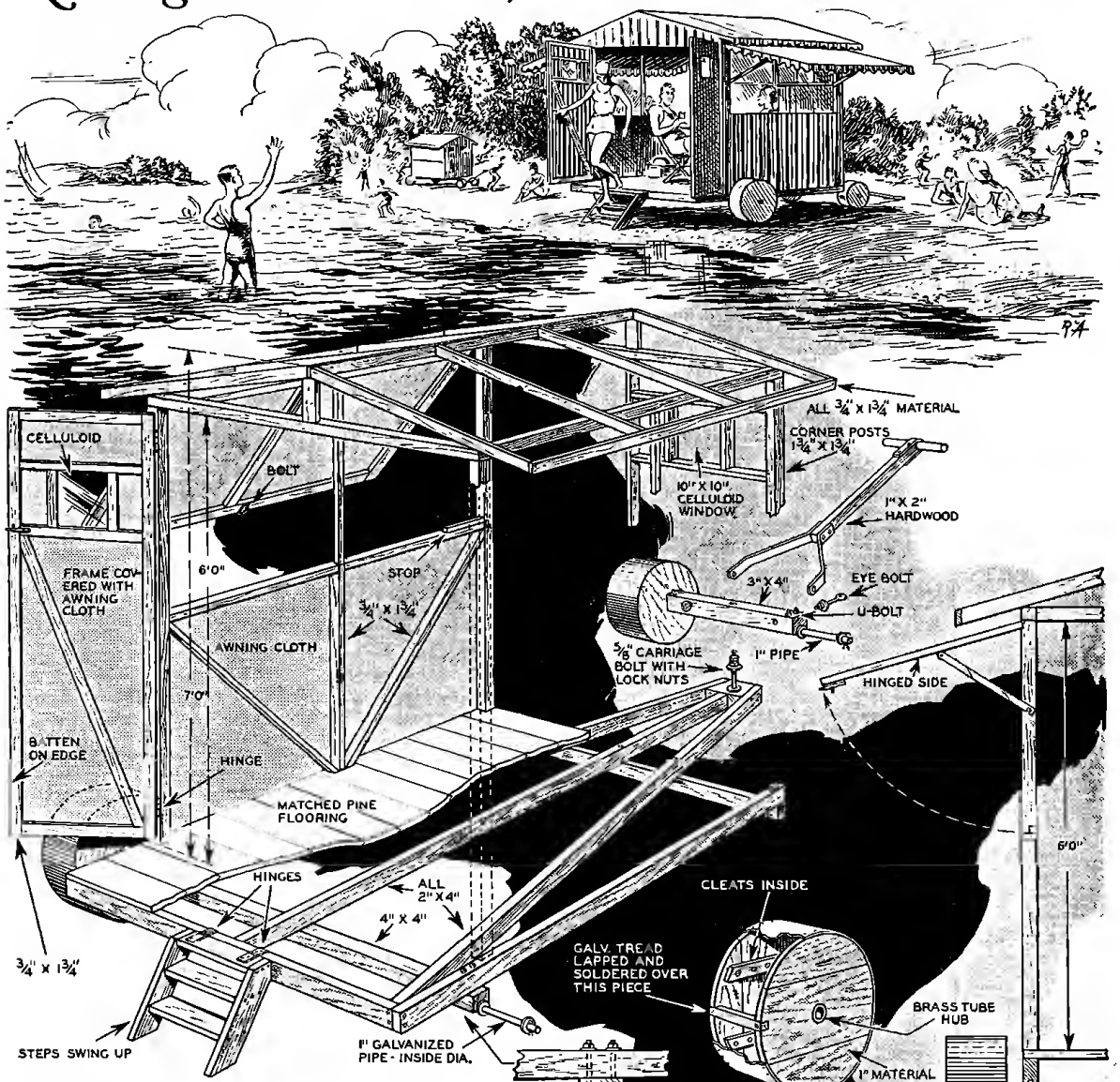
Start construction by making the various pieces which comprise the duck proper. The shapes of these parts can be easily determined by enlarging on the blocked-off drawing shown above; and the cutting can be readily done on the scroll or bandsaw or by hand. All of the "duck" pieces are bradded together, the head being mounted between the two side pieces by means of a ⅛" bolt with suitable washers on either side.

The spring is made from a short length of spring steel wire which is looped twice around the head bolt and then carried forward and inserted securely into the wooden top of the float. The tension on the spring must be adjusted very loosely in order to get the proper bobbing action. One of the blades of the paddle should be long enough to strike the bottom of the head, the other three merely serving to power this one striking blade. Construction of the paddle wheel is fairly apparent. A suitable finishing nail makes the shaft.

The central opening in the baseboard should be large enough to allow the paddles to clear while retaining sufficient stock to hold the nails securely.

By all means, use brilliant colors in the painting. A yellow body and bill with black head and a dab of red in that "backward looking" eye will do well, but you can use any other combination as suits your fancy. The finished photo shows the two screweyes to which is fastened the drawstring. This should not be over 40 in. long.

Rolling Bath-house, Beach Shelter in One

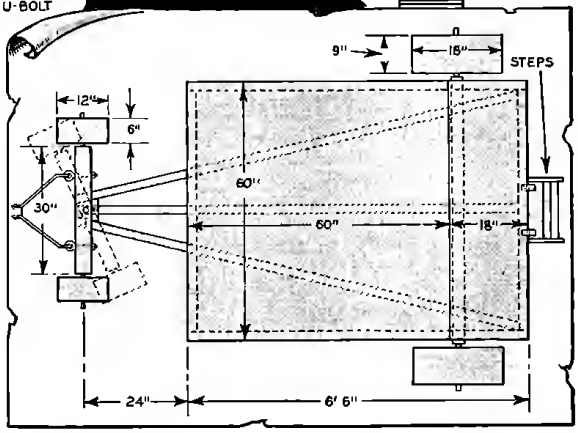


Necessary dimensions and materials are given in this drawing. Canvas makes best covering for framework.

THIS light, portable bath-house serves a double purpose. It can be drawn to the water's edge and used as a dressing room, or the doors can be thrown open and the sides raised to make an airy beach shelter.

All necessary constructional details are given in the accompanying drawings. Construction of the wheels calls for comment. Literally they are simply drums with a galvanized shell of wooden heads. A section of brass tubing just large enough to slip over the pipe axles serves as a hub. These should be driven into the wood discs to fit tight. Be sure they are accurately centered and true.

The galvanized iron should be heavy gauge, and for a first class job axles should be ground or trued on a lathe so as to fit the hubs more closely. Apply hard grease liberally before putting on the wheels.



Top view of the bath-house shows disposition of the wheels. Note that front wheels are smaller than rear wheels, to conform to the slant of the beach and keep floor level.

Fortunes Waiting for Inventors

by RAYMOND F. YATES



An improved earring, one which attaches firmly but without pinching the lobe, will win a fortune for some inventor.



A clever inventor can cut the weight and cost of camera tripods with single-leg stand. Manufacturers will welcome the device.

Editor's note: Mr. Yates, the nationally known patent expert who conducts this department, will answer questions of readers desiring advice on how to secure patents, or methods of procedure, or on ideas for inventions, when such requests are accompanied by a stamped, self-addressed envelope. Never send models, as they will not be accepted. Address Mr. Yates care of Modern Mechanix and Inventions, 529 South Seventh Street, Minneapolis, Minn.

1. *A Fortune in Earrings*

MANY millions of sets of cheap earrings are sold in the chain stores every year. Mechanically these things belong to the middle ages. They are held in place actually by two small set screws that not only irritate but also become loose and permit the earrings to drop off. If you do not believe me ask your wife or your girl friend.

Let's get a new way of keeping these things on the ladies' ears. Why not some sort of a little spring arrangement that will always be at the same tension and that will firmly hold the earrings in place? Here is a simple little idea with the possibilities of volume sales and a fortune in royalties in the space of two years.

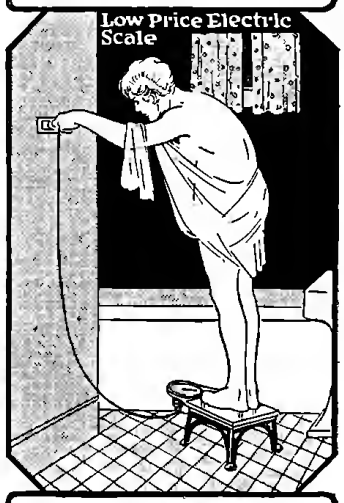
Specifications: Should not pinch the ear or leave marks. The holding mechanism should be more or less invisible and not bulky or unsightly.

Exploitation: Should be patented in the five leading countries of the world and should be sold strictly on a royalty basis.

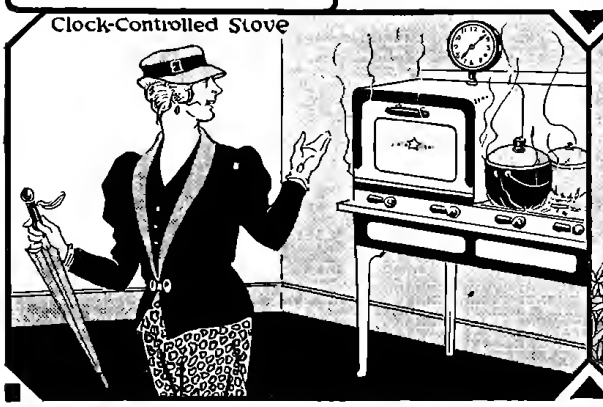
(Continued on page 128)



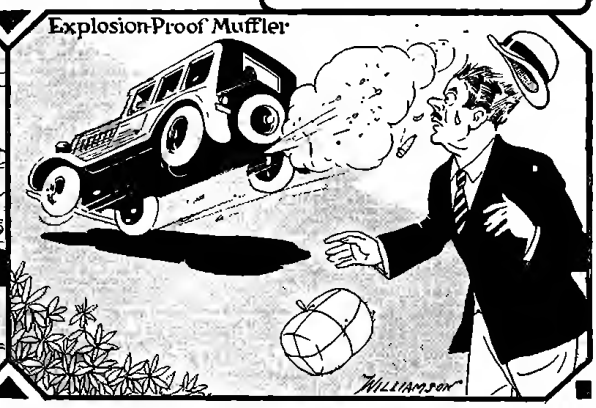
Lack of a medicine dropper is often responsible for overdoses. A combination dropper and cork will remedy the situation.



The dieting fad will prove a gold mine to inventors if they will devise a cheap electric scale operating like condenser.



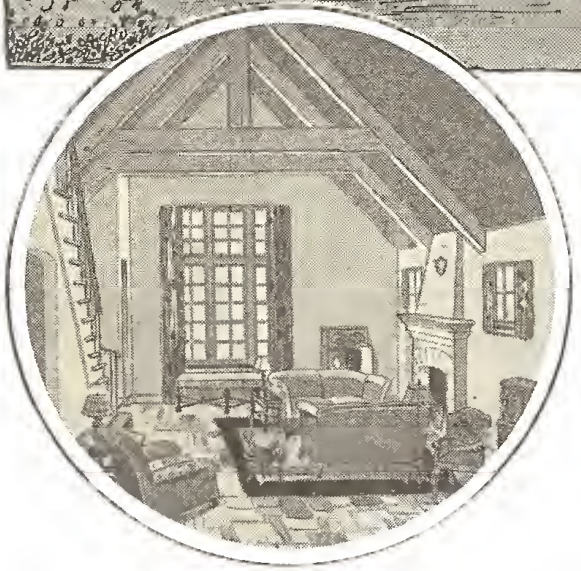
A clock controlled kitchen stove will free women from bondage to the kitchen and bring huge rewards to the inventor. Housewife can shop while dinner is cooking.



Perfectly good mufflers are frequently blown to smithereens by ignition of raw gas in the exhaust. Inventors can remedy this with a high pressure valve or flap that will save muffler.

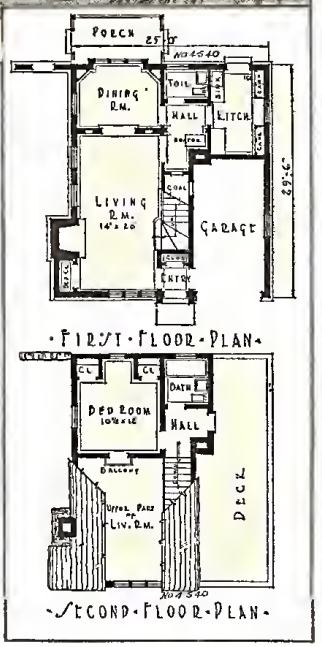
Build a HOUSE in IRISH STYLE





Attractive feature of House No. 4-S-40 is this spacious studio living room with a high ceiling and exposed rafters.

For complete blueprints of house illustrated on this page send $1.00 to Modern Mechanix Home Building Editors, 529 So. 7th Street, Minneapolis, Minn. Two new plan books, "Homes for Newlyweds," containing 32 of latest ideas for low cost homes in all styles, and "16 Selected Homes for Lean Purses," containing time, space and labor saving bungalows, may be had for 15c each, or both for 25c, from MM Home Building Editors.



Floor plans at right show you how convenient is the arrangement of rooms. House is planned for frame with stucco on metal lath and thatch roof, but you can build with masonry.

by MAURICE I. FLAGG

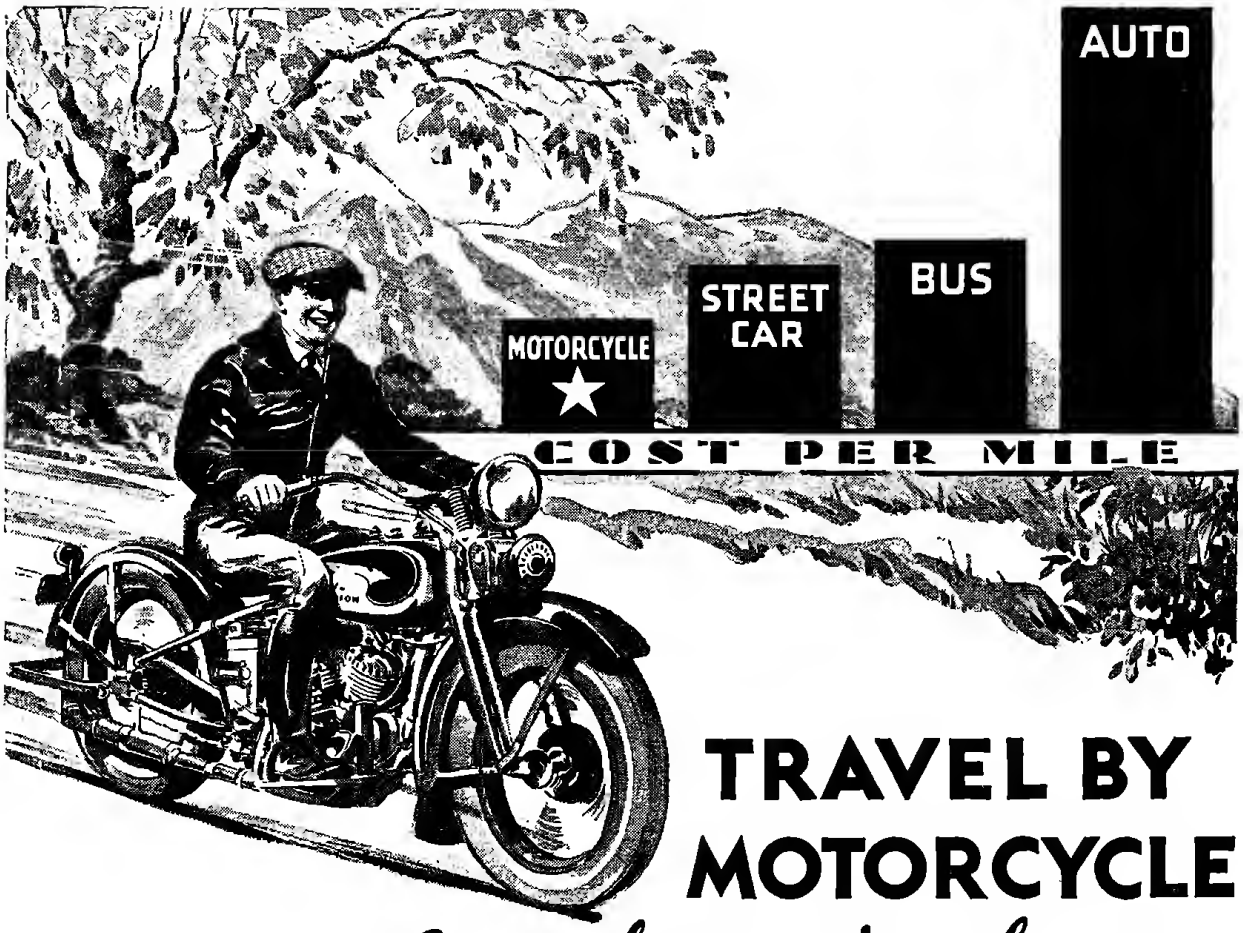
WE'VE borrowed style features from the Spanish, Italians, Swiss, Dutch, English and adapted them to American homes. Why neglect the fine traditions of the Emerald Isle? A house in Irish style sounds interesting, doesn't it?

In the little house above (Plan No. 4-S-40) the designers have merged a bit of old world tang with a dash of American daring. The result is a house brimful of originality and modern features. In addition it is a house that can grow as your purse permits and the low initial cost to build is one of the outstanding features.

The house contains a studio living room with high ceiling and exposed rafters. A Romeo and Juliet balcony opens from the second floor sleeping room and overlooks the living room. Next to the fireplace is a bed closet. This may be used for emergency sleeping service or permanent equipment. A lavatory on the first floor, always a convenient feature, makes the first floor complete as far as bungalow service is concerned.

The dining room floor level is raised one step above the living room. A porch may be built at the rear of the dining room if desired. The second floor is planned for picturesque effects. A vanity alcove between the two closets will please the ladies. Opening from the upper hall is a door leading to the deck of the garage. This deck can be used for living or sleeping purposes

(Continued on page 126)



TRAVEL BY MOTORCYCLE

Great Sport—Big Saving

★

Records of total operating cost below one cent (1c) per mile are frequently reported by Harley-Davidson riders . . . This includes all items of upkeep. Mileage costs, of course, are higher with sidecars and commercial outfits.

SWING into the saddle of a Harley-Davidson for a wonderful vacation or week-end trip. It will be doubly enjoyable because every happy mile will show a big saving over any other form of speedy travel.

Ride away—with the breeze in your face and a song in your heart—while the quiet Harley-Davidson whirls the miles away so contentedly—and economically!

Let your nearby Harley-Davidson Dealer show you the thrifty, speedy 1933 Models. Ask about his Pay-As-You-Ride and Savings Purchase plans that make buying easy.

Ride a HARLEY-DAVIDSON

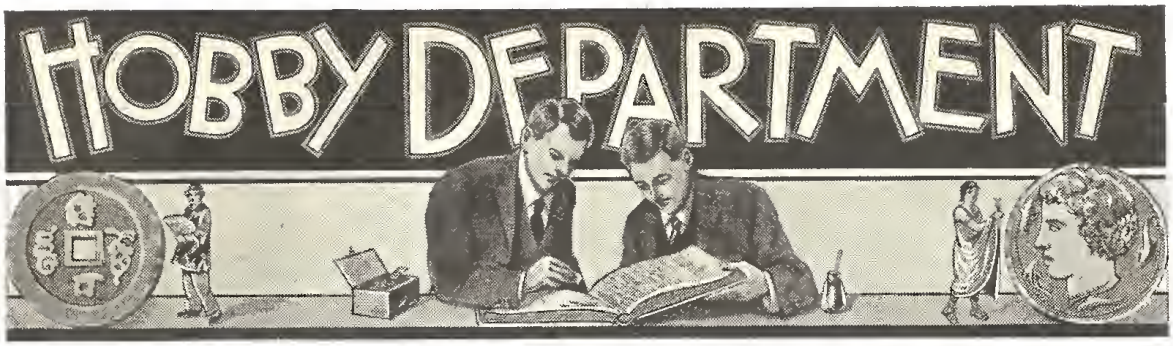
MAIL COUPON

HARLEY-DAVIDSON MOTOR COMPANY, Dept. MM, Milwaukee, Wis.
Interested in your motorcycles. Am enclosing Postage Stamp for illustrated literature.

Name _____

Address _____

My age is ☐ 16-19 years, ☐ 20-30 years, ☐ 31 years and up, under 16 years.
Check your age group.



New U. S. Stamp Issues

THE first stamp issued by the Roosevelt administration, the Newburgh issue commemorating the 105th anniversary of the proclamation of peace by Washington, is now on sale in the three-cent denomination. Some collectors have expressed disappointment that the Newburgh stamp is not a large pictorial but is the same size as the regular issue. One and three-cent stamps commemorating the World's Fair in Chicago are now available. The one-center will show a replica of Ft. Dearborn, the three-center the Exposition administration building. Texas has requested the issuance of a commemorative stamp, as this year marks the hundredth anniversary of the Lone Star State's admission to the Union.

New Silver Coins for France

TWO new silver coins in ten and 20 franc denominations have just been put in circulation in France, as shown in the reproduction below. The obverse bears a wreathed head of conventional design and the words "Republique Francaise," while the reverse carries the denomination figure and the French equivalent of "Liberty, Equality, and Fraternity"—that famous slogan of the French Revolution.



New 10 and 20 franc coins put into French circulation.

Stamp History of the Akron



Two out of five special postal markings for the Akron.

PHILATELISTS who collected air-mail covers on the Akron now have a complete album history of the ill-fated dirigible, which fell into the Atlantic to its complete destruction a few weeks ago. Two examples of the five official cachets are reproduced above.

It was thought that the possibility of issuing a special commemorative on the Akron was good, but the idea has been rejected by the post office department on the grounds that activities for the rest of the year are completely mapped out. Thus it seems likely that the Akron is definitely out of the picture so far as new philatelic items are concerned.

The five cachets commemorating important events in the Akron's history therefore stand finally as follows: The ring-laying of the ship, Nov. 7, 1929; the christening; its first flight; its coast-to-coast flight; and its tactical training flight.

New Foreign Stamps



PERU, which lately has been on the front pages of the world's newspapers following the assassination of her president, is also represented by two new items of more interest to the philatelist—a two centavo blue and a four centavo sepia, the former of which is reproduced herewith. Both show the important city of Arequipa, with the snow-peaked mountain of El Misti rising in the background.

The Netherlands have three new stamps honoring William of Orange, sixteenth cen-

(Continued on page 118)

Thrills!

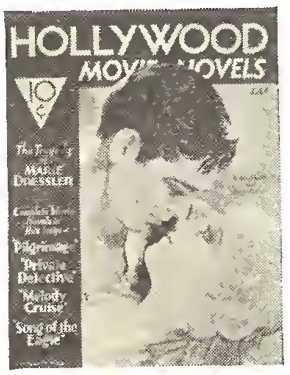
For real thrills read "Private Detective", the story of a racketeering private detective; "Song of the Eagle", a gripping yarn of legal beer and killer gangsters who tried to muscle in, and other great fictionizations of current movie hits. You'll find these reading thrills only in—

JULY

HOLLYWOOD MOVIE NOVELS

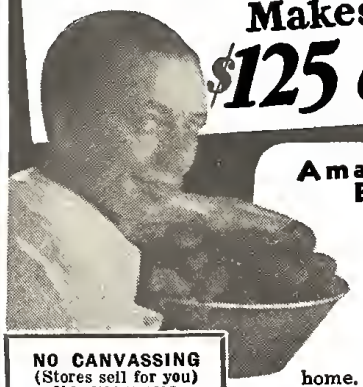
NOW ON SALE!

Every month this popular magazine publishes the latest and most entertaining talkies in story form, written by leading writers of the day. In addition you'll enjoy the many other features and fascinating pictures of your favorite stars and Hollywood life. Be sure to read every issue!



If your newsdealer is sold out, send 10c (stamps or coin) to HOLLYWOOD MOVIE NOVELS, *529 S. Seventh Street, Minneapolis, Minnesota, and your copy of the July issue will be mailed direct to you.*

Works at Home Makes up to $125 a Week



Amazing New Food Business Makes

$48 a Day

Actually Possible

Yes, you can make money even now! Install this surprising new machine—in your home. After that, $1.95 investment in raw materials brings back $12.80 in cash. You manufacture at home, others sell for you. A small investment in machine enables you to

NO CANVASSING
(Stores sell for you)
NO WAITING
(Make money first day)
NO STUDYING
(Experience unnecessary)
NO FAILURES
(Machine does everything)

START A BUSINESS AT HOME

Do like Winther did. (See photograph). He lost his job—couldn't find work. Started in this sensational new business and is making money hand over fist. Inside 90 days averaged as high as $125 a week!

A wonderful new machine, invented by Chicago food specialist turns out the most surprising food you ever tasted—an amazing new kind of potato chip. This revolutionary invention shows how 9 vital health giving minerals, always found in raw potatoes, can be retained in cooked Potato Chips. Minerals give Potato Chips surprisingly new tangy flavor. Instant taste appeal. Great repeater. A wonderful health food. Stores ready and anxious to handle all you can make. One machine at full capacity earns $48 a day on wholesale business alone.

Costs Nothing

to get full facts. Here's an amazing profit opportunity for men who can see big money in enormous volume of small sales. Quick success possible anywhere—big city or small town. Start at home in space 52x20 inches. We furnish machine, recipes, all equipment, automatic sales plans. Show you how to make money first week and build permanent business quick. No experience needed. Free book tells everything about this surprising and absolutely new business. Write or wire today.

A. H. ADAMS, President, Vita-Seald Potato Chip Co.
Dept. S-2419, 500 N. Dearborn St., Chicago, Ill.

70 MEN

Winther is only one who has made big money. 70 other men cleaning up. Some making only $50 or $60 a week. Others as high as $100 and more. Write for facts now. All FREE. **23-27**

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Without cost or obligation, please send me full details of your home-study course in

☐ Show Card Lettering
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Name.....

Address

ADLETS FOR HOBBYISTS

STAMPS AND COINS

TRIANGULAR Costa Rica, Marienwerder, Afghanistan, Brunei, Diego Suarez, Corea, Surinam, Grenada, Allenstein, and genuine Baden—All for 5c to approval applicants. Viking Stamp Co., Dept. M, Sheepshead Bay Station, Brooklyn, N. Y.

8 DIFFERENT coins—25c; California Gold, half dollar—50c; 12 large U. S. cents—$1.00. Chester Brooks, 5414 Ashlane, Dallas, Texas.

HANDY INDEX to Stamps ("The Stamp Finder"), 24-page illustrated Booklet on Stamp Collecting, and 208-page Annual Catalog listing everything for the stamp collector, sent for 10c to cover mailing expenses. H. E. Harris & Co., Dept. MM, 108 Massachusetts Ave., Boston, Mass.

UNITED STATES—Nine stamps cataloguing $1.00. Special 10c. Superior, Box 1276. Palm Station, Los Angeles, California.

ATTENTION: Send for our illustrated price list of sets and packets. We carry a stock of five hundred different at all times. Many bargains, postage (3c). Collins Stamp Co., 18 Kensington Ave., Jersey City, N. J.

STAMPS! 100 diff. 2c; 500 diff. 35c; 1,000 diff. 90c. Tatham Stampco, D9, West Springfield, Massachusetts.

15 CEYLON, 15 Gwalior, 15 Hyderabad, 15 Patiala, 15 Persia, 15 Siam, 15c each packet. Unused stamps accepted. Imperial Stamp Co., Allahabad 74, India.

50 FINELY Assorted Japan 10c. Hollystamco, Box 1966, Hollywood, California.

FORTY different United States and United States price list 10c. Seidenberg, Baroda, Mich.

FIFTY unused stamps 10c to approval applicants. References. Burns, Box 142, Pittsburgh 16 Pa.

3 SCARCE diamond-stamps 10c. Albert Gardner, 5220 Cuthbert, Baltimore, Maryland.

HOBBY DEPARTMENT

(Continued from page 116)

New Foreign Stamps

tury leader of the lowlands in their historic struggle with Spain. A fourth stamp shows the Dutch coat of arms. Prince William was born in 1533, making this year the four hundredth anniversary. The portrait of the Prince shows him in military dress, with the high collar and shiny breastplate of the times.



A new Falkland Island series is notably beautiful, produced in steel plate engraving in two colors. The center of each stamp in the series is printed in black, with a border in a second color, varying with the denomination. The pictorials show typical scenes of this far south country, including an iceberg, a whaling ship, a whale, a penguin, etc. There are a total of twelve stamps in the series, ranging from halfpenny to one pound. South Georgia, in the Falkland Islands, will be remembered as the burial place of Sir Ernest Shackleton, famed leader of Antarctic expeditions. For the first time since 1895, Swaziland is represented with a new issue. Ten values, ranging from halfpenny to 10 shillings, comprise the series. A portrait of King George V appears on all of them, surrounded by a medallion of Swazi emblems.

Russia celebrates the fifteenth anniversary of the Red Army in seven large sized pictorials, each portraying in double panels a branch of the service as it was in 1918, and as it exists today. They were printed in photogravure. Expected soon from the same country is a set of 21 commemoratives depicting racial types.

Greek Coins Surpass in Beauty



IN THE opinion of many coin collectors, the designs of the ancient Greeks for their metallic money have never been surpassed. Perhaps this is only to be expected from a nation whose ideals of art still set the standards for our own in many ways. Perhaps most notable of all in the beauty of its coins was the city of Syracuse. A decadrachm which passed current in the city some two thousand years ago is shown in the reproduction above. It is done in silver and presents on one side a magnificent head of Arethusa, surrounded by four dolphins, and on the other a four-horse chariot. Details of execution are incredibly fine. No wonder numismatists grow enthusiastic in the collection of these fine old coins.

$5 Gold Piece Worth $10,000



SO rare that only three of them are known to exist, the United States five dollar gold piece issued in 1822 comes pretty close to being the world's most valuable coin. It is in such demand by collectors that an offer of $10,000 for one was recently refused. Since there were 17,796 coins minted, it is puzzling to account for its rarity, and it is quite possible that more examples would come to light if their owners were aware of their value.

Another rare gold coin of American issue bears the date 1877. These were in $50 denominations, and only two were struck in gold, although a number of copper specimens were turned out from each of two sets of dies. Handsome in appearance, the $50 denominations were largely experimental and never got to the stage of public issuance. This was the only occasion in which the United States ever struck a $50 gold coin, except for commemorative issues of 1915.

Clown Alley—The Lane of Laughs

(Continued from page 72)

circus joey is a sad fellow who smiles through perpetual tears. Like most troupers, clowns have a joke for everything. The spangled highway is pretty steep climbing at times and a sense of humor is a suit of armor. The story of the demise of the noted Irish clown, Johnny Patterson, is a classic and bears repeating:

Patterson lay dying in the dressing tent of an English circus. His doctor, upon departing, said: "Goodnight, Johnny. I'll see you in the morning."

A shadow of a smile flickered across the old clown's face as he replied, "I know you will, Doc, but will I see you?"

Perhaps you've noticed that the raiment of circus joeys, unlike a clown suit that you might rent for a masquerade, often is a work of art. The clown wardrobe must be tailored according to the best circus standards and made from material that will stand the rigors of the long season on the road.

And have you ever noticed that clowns never look quite alike? Once a joey makes up his face in a certain combination of color and design, no other clown copies the make-up. Clown white, the principal color in the clown's make-up box, is the same ingredient that is used as a base in the manufacture of cold cream, so the complexions of th jesters really are aided by the application of the make-up twice a day.

Next time you see a circus notice how many of the clowns have pets—dogs, geese, goats, mules and even pigs. Joeys with pets have been known to get into trouble with the Society For the Prevention of Cruelty to Animals and for amusing reasons. One clown, whose "walk-around" consisted of leading a very small dog on a ridiculous rope leash of enormous thickness, received a call from an officer of the S.P.C.A. who protested against the stunt, not realizing that the clown and not the dog carried the entire weight of the rope.

A clown pet that was a failure as a circus performer remembered his circus training in a critical hour. This was "Bill," a clown "pad-dog"—so named because he had been taught to grab a clown by the padded seat of his pants and to hang on. "Bill" had a habit of letting his attention wander when he should have had his mind on the serious business of clowning. More than once he left the hippodrome oval and went up into the grandstands in answer to a friendly whistle or in search of sweets. This didn't exactly help the act, so "Bill's" master gave him to a friend in a big city and found a new "pad-dog." The following winter "Bill' was sleeping peacefully behind a stove when a tramp entered his new master's kitchen and started looking for refreshments. "Bill" growled and got to his feet, but the prowler pacified him with a soft command. Then the fellow leaned over to investigate the bottom compartment of the refrigerator and the dog remembered his old circus routine. He was still hanging on when his master came downstairs in answer to the frantic shouts of the invader.

STOPPING LEAKS
WHERE THE METAL IS THIN

Smooth-On No. 1 forced into seam openings, between rivets, or into the holes quickly metallizes and thereafter is tight against hot or cold water, steam, smoke, oil, gasoline, gas, etc. It holds in any metal and can be used as well to stop leaks at joints and cracks in cast or wrought metal pipes, radiators, boilers, and furnaces. Use it also to tighten loose handles and to anchor loose bolts, screws, etc., in metal, concrete, tile and wood.



Write for
FREE BOOK

By following directions in the Smooth-On Repair Booklet, you can make repairs at a fraction of what a repair man would charge, and you avoid annoying delays.



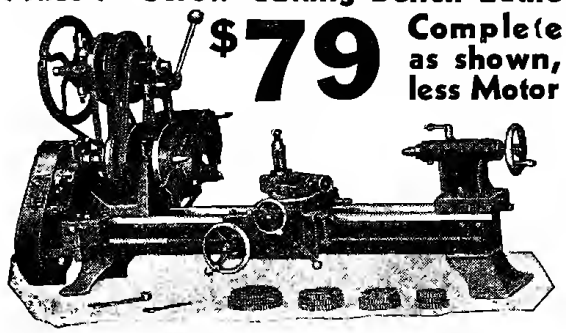
Get Smooth-On No. 1 in 7-oz., 1-lb. or 5-lb. tins at any hardware store or if necessary direct from us.

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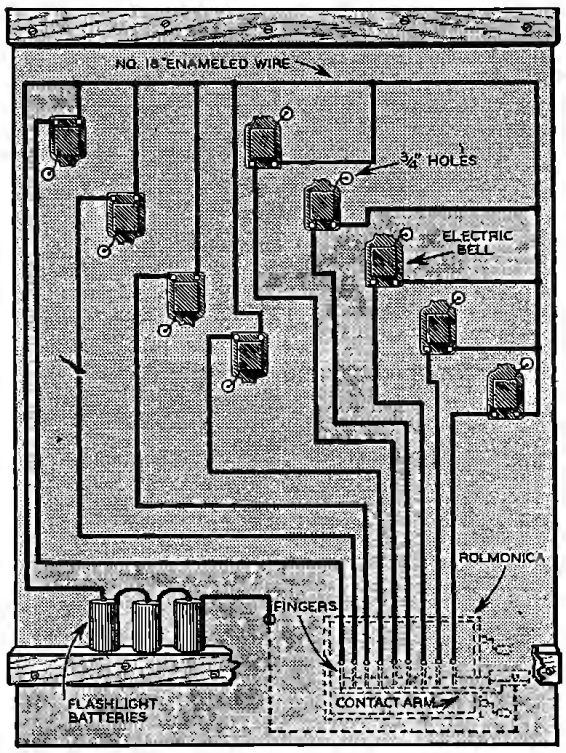
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Wiring Diagram For Electric Guitar

(Continued from page 104)



Here's the wiring diagram for the electric player guitar. Note how the bells are staggered to save space. The three small cells can be replaced by a Columbia hot shot battery for long life and positive action.

will come, holes, ¾" diameter will be bored through to allow the clappers of the electric bells to come through. This spacing of the holes is made by making a pattern out of one of the bells, marking where the clapper comes in the spacing as the drawing shows, and then boring when all are marked.

The Rolmonica is mounted on the front side of the board along the 18" face. (Note: The guitar has a tone resembling that of a miniature piano, but of high pitch. If a deeper tone is desired use longer strings and a larger board.) A hole is whittled out for the movement of the cranks, and the back of the case is nailed right to the board, or better yet and what is more neat, screws can be used. They should be ½" No. 7's countersunk and pre-bored.

The "blow" half of the Rolmonica is thrown away, as the contact fingers and bridge must be super-imposed upon the record so that when an opening in the record comes along, the finger goes through, wipes upon the lead face which we have just smoothed off with a soldering iron and file, and thus makes a contact that rings the clapper of the bell and which in turn strikes the note needed.

24-gauge brass fingers arranged on a piece of hardwood with Meccano bolts to hold them to the wood, and with a flexible gang of cotton covered wires leading to the underside of the board and to the wiring diagram, will do nicely. Such fingers will be found to be firm and make good contact. The circuit to use is shown in the wiring diagram.

Wiring Diagram For Electric Guitar

Some of you will not want to go to the trouble of neatly stapling the wires on the underside of the board, but it makes trouble shooting easier, so I advise you to carefully follow out the diagram closely.

The Hot Shot battery will be found strong enough to ring three or even four bells with about the same degree of frequency, so that when a harmonic is played by the record there will be no appreciable dimunition of volume. It is wired into the circuit as the diagram shows, and for neatness' sake is placed under the board, thus affording weight enough to hold the electrical harpsichord firmly while being played.

The photograph shows how the rubber picks are attached to the clappers. Some adjusting will be required here. The picks are made of rubber cut from the casing of an automobile tire, and should be alike as nearly as possible. One reason for the selection of the ten note Rolmonica to fashion our automatic guitar from instead of selecting the sixteen note chromatic Rolmonica was because such a selection eliminated some work in the duplicating of wiring, clapper picks, and so on. There is nothing to prevent you from building a larger guitar if you want to do the extra work needed to bring out the chromatic effects.

With the rolls mounted and the bells fastened, and the wiring and the battery in, the next thing to do is to string the instrument, and place the bridge.

The bridge is fastened at one end, the left or bass end, first. Then the note is tuned into the string using the lowest note of the detached mouth organ as a guide, or by using a piano. Then when this is tuned approximately, and screwed in near one end for placement, the other end is tuned. This will be an octave and two notes higher than the lower string. When this note has been approximately determined, the bridge may then be permanently fastened in with the assurance that the intermediate strings, with slight variations in tension, will fall into tune readily with a little ear work and key work. The method of stringing the keys and the bridge is shown in the drawing.

Before uniform music can be had, it is necessary to see that each pick on each clapper has about the same amount of "twang" or impression of each string. About 1/16" overlap is all that is necessary. *Enough flexibility must be allowed to enable the bell to make and break circuit readily,* otherwise there will be a disconcerting lag in some notes.

To play the Player Guitar, select the roll you want—there is a great variety to choose from at ten cents a roll—and place it on the recording device. Close the circuit with the switch—in other words "turn on the piano"—and crank the record by hand, evenly and as fast as is needed to make the music sound lively enough. The battery and the record will do the rest.

And then there is the sport of making records for yourself by figuring out the notes, the length of time they should dwell on the record contacting finger, and then cutting them out and playing them. Some funny musical effects can thus be achieved.

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31x5.25-21	2.95	1.15	33x5	3.25	1.45
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A Telescope for "Star Gazing"

(Continued from page 98)

as the tool in forming the mirror. Take the piece of glass to be used as the tool and secure it to the working surface by three cleats spaced equidistantly about its circumference and so prevent it from sliding in any direction. A few minutes' application of a fine wetted Carborundum stone around the upper edge of the tool and the same application to the face of the glass which is to become the *mirror* will give the slight bevels which will greatly reduce the danger of splintering during the succeeding operations.

Heat the Mirror

Now heat the *mirror* gradually in water until it is uncomfortably warm, rub a little turpentine on the back and pour on just enough melted pitch so that the handle (half croquet ball or what have you) may be firmly pressed down on the glass to a firm and level position as the pitch sets. See Fig. 2.

We are now ready to begin the grinding operations, but not, however, without the necessary understanding of the functions involved.

Refer now to the four operations depicted in Figs. 3, 4 and 5. The operator "strokes" the mirror back and forth over the surface of the tool as illustrated in 1 and 2, Fig. 3. The longest stroke used is illustrated, namely, whereby the center of the mirror is carried forward to the edge of the tool and then back until the center of the mirror is over the rear edge of the tool. In addition to the forward and back stroke, the mirror is rotated by the handle, within the operator's grasp, about its own axis. (See 3-3, Fig. 3.)

The Grinding Technique

The third motion is produced by the slow travel of the operator himself about the working surface while with his hands he is performing the two previous grinding movements. These three motions are depicted schematically in Fig. 3. The operator is grinding the mirror back and forth over the tool (gray circle) as indicated by the long arrows 2 and 2; at the same time he is revolving the mirror around its own axis a "notch or two" at a time as indicated by the arrows 3 and 3 and additionally is slowly side-stepping around the whole working position as indicated by the outermost row of arrows. This last movement can be in either direction, of course, as can be 3 and 3 and in the case of working around a bench corner the operator's "orbit" will have to be confined to three-fourths of a circle, around the back, etc. The net result of following the instructions outlined is that the mirror and tool are worn away in relation to each other. The mirror becomes worn in a concave manner and the tool in a convex form and the concave spherical mirror is what we are after for our telescope.

Rest of Details Next Month

This for the time being concludes our activity in the matter of description of the making of a telescope. We have depicted the optical set up of our 6-inch reflecting telescope, have described how the lens is made, and have shown a diagrammed set up of the frame for holding the mirror and eye piece, which will engage our attention next month.

I Learned About Lions

(Continued from page 43)

month, for a few days an egg is whipped into the milk. Gradually they are weaned from this diet onto raw meat, with a garnishing of bone and kelp for the needed minerals and vitamines.

If an African lion prefers the warm sun, I early argued, why not give our lions that pleasure? Also, I recalled, African lions often were seen sunning themselves atop termite mounds. From these points of vantage they not only would be warm, but also could keep an easy lookout over the countryside.

Accordingly, I had erected runways consisting of three telephone poles leaned against a supporting framework. Like their brothers afar, my lions spend their morning leaping onto the high ends of these sloping platforms, reposing peacefully on their warm slopes and racing around the enclosures. One fellow keeps himself warm by galloping in a figure "8" around his enclosure. Now he has a well-marked trail which he follows.

No Use Punishing Lions

Were one of my finest lions to attack me, there would be little object in returning to the enclosure to punish him. As I have pointed out, they have brief memories and he would only look on me in surprise were I to strike him with a club or whip; he would look surprised, that is, unless he took a notion to strike in retaliation.

Though I have shipped lions to all parts of the world and some of them have become famous for their exploits and handsome appearances, they gain their reputations from good looks and apparent ferocity. They're not smart.

By constantly repeating a routine, which ends always at the same point—pedestals in a circus, or their cages in the case of movie appearances —they learn to do certain tricks, some of which appear difficult. Yet in less than an hour I can train any lion to do tricks that seem to require great intelligence.

For instance, when a motion picture company was filming scenes in one of our enclosures not long ago, the director wanted a lion to jump on the back of a horse. Sounded difficult. We placed the lion's cage on a platform about six feet above the ground. Immediately beside the platform a dummy horse, made of wood, was planted. The lion found it necessary to jump on the dummy in order to reach his cage.

Tricked Into Acting

When the time came for shooting the scene, after the animal had been run through the routine several times, a real horse was substituted for the dummy. Before Mr. Lion noticed the change he had leaped on the live animal. Meantime we closed the entrance to his box, and he had nothing left to do but hang on as the horse bounded in excitement. Of course we took precautions against any injury befalling the horse and quite a thrilling scene resulted.

My novel farm has been in operation only nine years. Our oldest lion is seventeen. I have heard of lions attaining the ripe old age of 40. Possibly in 1956 I shall be able to report the older members of our crop still alive and thrilling the public.

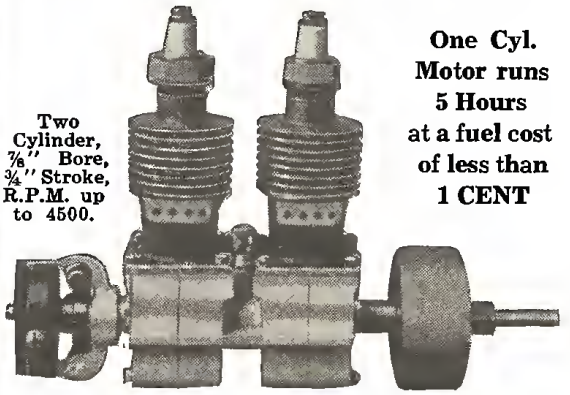


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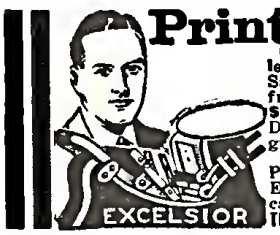
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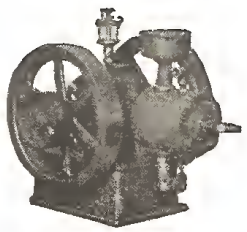
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Revised Edition of 'Swimming Hole'

(Continued from page 93)

ly excavate a hole with team and scraper, then set up the forms, square them, and tie at frequent intervals with soft wire to prevent spreading, when the concrete is poured. These should be run from upright 2 by 4 inch studding on each side as shown in the sketch. To insure a better job, the forms should be set over a trench of perhaps 10 inch thickness and 6 or 8 inches in depth to form a footing when the concrete is placed. Further bracing details may be worked out on the job.

Before any concrete was poured, the ¾-inch bent pipe pieces, 18 inches long with the ends bent over at right angles for 6 inches, were prepared for the ladders and holes bored in the proper places in the forms. The inlet pipe to lead water to the rotary pump, with fittings was also prepared and laid ready. This was run through the wall and assembled. Then the concrete was mixed and poured. If you are to do this in spare time, you should plan to mix and place a batch in the morning before work and again at night so that too long a time will not elapse between pourings. The longer concrete sets, the harder it is to affect a good bond. And before pouring each succeeding batch, the surface of the last pour should be soaked with water, if it has set. It goes without saying that this pool required considerable cement—nearly 200 sacks. You can skimp on the walls and make them 4 inches in thickness, but reinforcing should be used throughout, and the mix made a little richer—so no particular saving will be effected.

The floor was laid 3 inches thick over the top, inside of the footing, and laid 6 feet below the top at the deep end and 3½ feet below the top at the shallow end. This gave a very slight slope which was not slippery.

To the back side of the rock arch, bridge and the series of waterfalls lies a small wooden box partly below ground. Inside is a ¼ horse power electric motor from a used washing machine, and a small rotary pump. This takes the water from the inlet pipe not far below the pool's surface, forces it upward through a pipe lying against the inside wall of the garage, and from there the water tumbles down to the pool again.

This same installation inside the garage has a valve for a shut off and a faucet so that, if desired, the water may be pumped out with pressure through the garden hose. And, when the pool is to be filled when empty, another hose leads from another faucet up to the discharge pipe at the top of the rock pile. Due to evaporation and slight leakage, fresh water from the mains is run into the pool perhaps twice a week to maintain a constant level. Minor details of this interesting pool can be worked out as they present themselves. Along one side lies a brick walk while the two adjacent sides are strewn with clean sand —this making conditions on a par with those of a commercial pool. Yet the upkeep is almost nothing. A little chloride of lime is introduced about once a week to keep down green algae.

Perhaps this layout just presented, is too comprehensive for either your space available, or your

Revised Edition of 'Swimming Hole'

pocketbook, or both. Then take a peek at another design presented herewith. Built of concrete silo blocks, this smaller pool may be built in any diameter from 12 to 18 feet.

Excavate down to firm earth, level the floor, then scribe the proper circle in the earth for a guide line, and commence to lay up the blocks. Metal tie strips, which may be deformed heavy wire, are used in above ground silos, and they will prevent possible cracks here although if the earth is firm and properly tamped on the outside, this pressure should offset the water pressure within. Keep the courses of block level and pay special attention to the joints. Use a rich mortar to which has been added a small amount of slaked lime to retard drying. This process continues to the top which is crowned with a mortar cap nicely rounded and extending down into the air spaces of the top course of blocks.

Later the floor is laid 3 inches thick with the edges brought up as shown against the sides. Some suitable drain should be provided. This should be a pipe 1 or 1½ inches in diameter extending just through the floor and stopped with a plug or pipe cap to which a chain has been attached. The pipe should lead to a sewer connection, or a natural declivity. The inlet pipe can merely lead over the top of the pool. Should you prefer to have this less conspicuous you may lead it through the wall below ground. You can seal a poor joint properly with hot asphalt which, upon cooling, becomes quite firm, and water tight.

It will be fun to add to this miniature pool, a shoot the chutes, and possibly an abbreviated diving board. An accompanying photo shows a somewhat similar pool, built of rock blocks on top of the ground.

A back yard swimming pool will pay handsome dividends in every case, in health for the family, added fun, and even on a commercial basis.

Explanation of Nic Sprank Oddities

Chemical analysis shows tomatoes to be composed 94.3% of water, while milk contains only 87% to 88% water, the rest being solids. Internally cooled exhaust valves, used on latest airplane motors, are hollow, filled with a material which becomes molten at operating temperatures enabling heat to be radiated away faster. If balloons are placed in a glass bell and the air exhausted around them, the balloons are filled with air from outside by atmospheric pressure, on the same principle that air flows into the lungs.

A gallon can which holds one gallon of carbon monoxide gas, will, if filled with charcoal, hold 650 gallons of the gas because of absorption by the charcoal which condenses gases within its pores. Cement dries under water when its free water is absorbed by unhydrated elements of the mixture as combined water, in which condition it no longer acts as a liquid.

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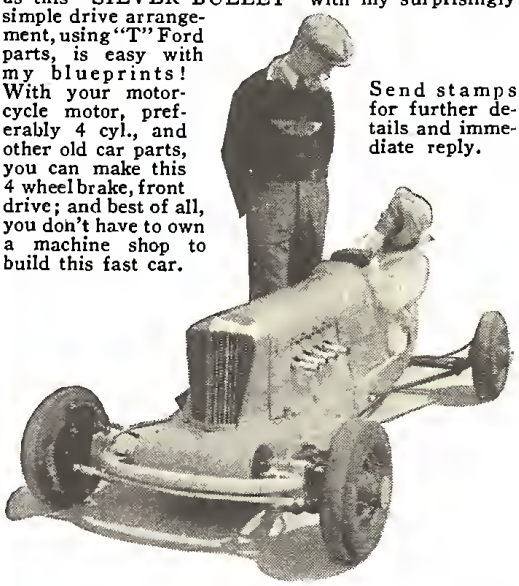
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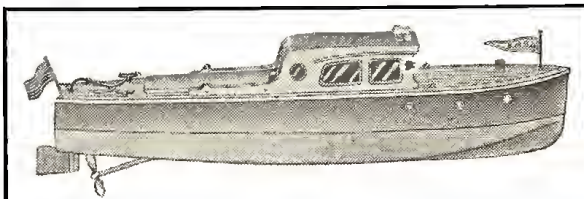
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Building a House in Irish Style

(Continued from page 114)

in summer. A second permanent bedroom may be built there.

This is a basementless house. It saves fifteen per cent. You may have a cellar if you want one. Notice the first floor heater placed in the rear hall is served with fuel through a wall opening beneath the stairs.

The house as planned is frame with stucco on metal lath and thatch roof. It can be built of masonry if you prefer. The cost? Figures taken in Chicago more than two years ago suggest $5500. Costs are lower now. The price will vary depending upon equipment and where the house is built.

Building "Wooden Shoes"

(Continued from page 89)

hulls together. The flooring of the catamaran platform is of dressed and matched pine. The motor is mounted at the proper angle and connected to a half-inch cold rolled steel shaft.

The propeller was something to bother us until we persuaded Sam Wing to build the pattern for the propeller. It is of 8" diameter and 5" pitch and will drive the little fellow along at about 6 miles an hour. The drawings show how the shaft bracket was made.

Because of the double hulled arrangement a rudder of unusually generous proportions was used and the details are given for the thing in the drawings on the first page of the article. All in all the little fellow makes a grand rig for playing about the beach or protected waterfront on calm days, and is no end of fun.

Model Airplane Teaches You to Fly

(Continued from page 110)

books or magazines to get it into the air stream of the fan. After starting the fan with a rheostat allow it to gain a little speed and then push forward slightly on the stick. This will raise the tail of the plane just as a real pilot does when he is running across the field for a take-off.

Pull back to neutral after the tail is up so you won't nose over. Then after the speed of the fan is at its maximum, pull back slowly on the stick and if the counter-balance is correct the plane will rise from the floor and climb to the top of the air stream.

Now you can bank and turn slightly. You will also soon notice that you are liable to do what most beginners do, that is "over control."

When landing the plane, nose it down near the floor, cut off or reduce the speed of the fan and just before it touches the floor pull back on the stick and try to make the tail skid touch at the same time that the wheels touch, a "three point landing."

Try taking off and flying with an extra weight on one wing so you have to hold it level with the ailerons.

If the plane tends to bounce up and down in the air stream, make the pivot of the lever arm a little tighter. If the plane is very unstable, be sure that the lead weights are not too high or the center screweye is not too far back.

Battles in Code for War Secrets

(Continued from page 51)

even $50,000,000 cash. Capt. T. Walter Gilkyson once made their regular trip from Washington to Chaumont, France, in seven days, six hours. They took the strain off the cables. We had not lost the hidden combat beneath the waves.

The A. E. F. named its codes for Indian tribes, to help confuse German radio operators across No Man's Land, who picked our messages from the void, and tried to read them. To plug these leaks in the air, G. H. Q. changed the radio codes used along the front, every three to six weeks.

As we assembled our new First Army for its first big drive at St. Mihiel, the need for secrecy became even greater. Lt.-Col. Frank Moorman, in charge of radio code and cipher work at G. H. Q., got these orders:

"The St. Mihiel area is getting full of American radio stations. We try to prevent the Germans suspecting our coming attack, but some of our operators are careless. You will detail operators especially to listen in on our own radio talk, to see whether the Germans doing the same thing—as of course they are—could discover our plans."

Colonel Moorman's report brought dismay. Knowing to start with no more than the Germans might know, in a few days and nights, he had found out where practically every American division was, and about what it was doing. But still worse, he knew that we were going to attack, and was only one day off as to when—and that because the American operator he had listened in on had slipped. If the Germans knew all that, our attack would be a bloody disaster! Major General D. E. Nolan, Chief of A. E. F. Intelligence, looked grave. No wonder the few who knew waited anxiously for reports, after the attack began the morning of September 12, 1918.

But the result was not bloody disaster, but glorious victory. The Germans had not known, after all, what our radio experts thought they must know. Once again, in the secret combat to hide our plans from the German code spies, we had turned failure into success—and more.

For this same American radio expert, arising early one morning, had found no American messages on the air. Instead, he had picked up a single German, busily sending time after time, the same string of code number groups.

"He must be practicing," thought the American, noting the numbers. He passed them on to our own code and cipher men, who asked themselves:

"What short message would a German send, over and over, for practice?"

The answer came: "Well, maybe some German proverb, or saying."

Starting there, they worked out this:

"The early bird catches the worm!"

And that appropriate sentiment proved the entering wedge to break down the new radio code that the German operator had got up early to practice! Trying to keep our own codes secret, we had hit upon a new German one. So, after all, our ingenuity and perseverance had not only hidden our plans that helped win the war, but won the hidden combat of codes and ciphers.



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Fortunes Waiting for Inventors

(Continued from page 113)

2. *A Tripod With a Single Leg*

When one stops to think the matter over, one wonders why camera tripods have three legs. Why not just one leg? There MUST be some way in which this could be done. How about a rubber vacuum cup? The vacuum cup is removed from the end of the "tripod" when the camera is used out-of-doors and the pointed end is simply thrust into the soft earth.

The purely commercial angle of this problem is rather interesting for by the use of a single leg we could not only greatly cut the cost of a tripod but we could also cut its weight one-third. The telescoping single leg should be adjustable so that it could be held at different heights.

Specifications: Light weight and adaptability to various conditions are the chief requirements.

Exploitation: To be sold outright to a large manufacturer of camera equipment. Should be patented in the principal countries of the world.

3. *Clock-controlled Kitchen Stove*

As I have mentioned previously, many tidy fortunes have been made by inventors who have provided housewives with some little gadget that would save time and labor.

When one comes to think of it it seems rather peculiar that some inventor has not produced a clock-controlled stove—that is a stove with each burner subject to time control by a central clock regulator.

With such a device the housewife could put a roast or pie in the oven or a vegetable on the burner and leave it with the assurance that it will not burn and that the gas will be turned off at the proper moment.

Specifications: Should not be excessively priced and should also be made so that it could be attached to the type of stove now in use.

Exploitation: Should be licensed out to all of the larger manufacturers of gas stoves.

4. *Dropper Top for Medicine Bottle*

"Take ten drops before meals in a warm glass of water," says the doctor. The patient has no really convenient method of measuring out these drops. It is high time some clever inventor developed some sort of a dropper-stopper for bottles, something that would not only act as a stopper but would also act as a dropper.

The dropping could be controlled by a slight squeezing or perhaps the thing could be made perfectly automatic. At any rate if such a thing could be made to sell for a dime in the drug stores I dare say that the royalty piled up within the space of one year would be sufficient to make the inventor rich.

Specifications: Cheapness and reliability are the two principal features to be sought. Both should be automatically sealed when standing in an upright position.

Exploitation: Should be patented in all of the principal countries of the world. Should be sold *only* on royalty.

Fortunes Waiting for Inventors

5. Cheap Electric Scale

I have often wondered why some clever inventor does not take advantage of the dieting fad among both women and men. But how take advantage of such a thing as this? you ask.

It's very easy. Bath room scales are very much in demand today, but they are too high. We need *very* cheap scales. Why doesn't some electrical experimenter develop a scale in which the sensitive element, in place of being a spring, is a compressible electrical resistance? The greater the weight on the resistance, the greater the reading on the meter.

Naturally the electrical meter used in connection with the outfit could be a very cheap one and in place of being calibrated in volts, it would be calibrated in pounds.

Specifications: This scale should sell for three dollars or less. It should be accurate to within 2 per cent and should not be affected by temperature or humidity changes.

Exploitation: Should be patented in all of the leading countries of the world. Should be sold outright in the U. S. for $40,000.

6. Explosion-proof Auto Muffler

When raw gas enters an automobile muffler it invariably explodes if a hot spark passes through the exhaust. The result is usually rather disastrous on the part of the muffler. Its sides are often blown out and the device rendered useless.

As a remedy, why not a high pressure valve or flap that will open under such strain and relieve this condition? At any rate I am turning the problem over to my readers.

Specifications: This must add nothing to the cost of building such equipment. Rather it must be perhaps a method of construction. An automobile manufacturer does not mind selling a man a new muffler and consequently if the manufacturer is going to adopt such a thing, he will not take it on if it is going to add to the cost of building a car.

Exploitation: Should be patented only in the United States and should be sold outright.

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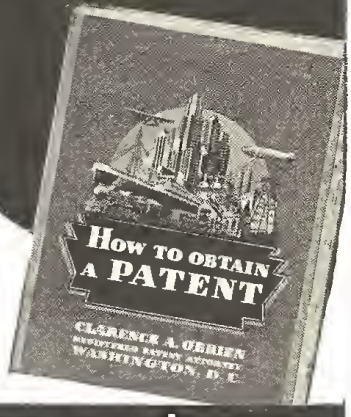
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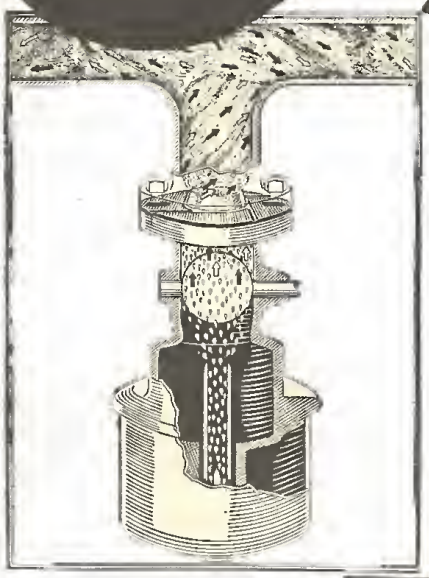
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A complete *factory-assembled* Ki-Yak Kit costs you $24.50—but you can SAVE more than *half* that cost by getting the factory-cut KIT, and assembling it at home in 2 days . . . at a cost of only $11.75 plus slight shipping charge. You get this SAVING because you buy in kit-form, and DIRECT FROM FACTORY! And you get a swell Skipper Cap FREE by ordering now *on the coupon!* Here is a "once-in-a-lifetime" opportunity to own your own boat at the LOWEST PRICE you ever saw! This daring craft, designed by aeronautical engineers, sets a brand-new standard in thrills, construction, performance and beauty. Nothing else like it! Compare the Mead Ki-Yak with *any* other boat at *any* price—then you'll realize more than ever what a great BARGAIN we offer you in this advertisement! But hurry. Order TODAY on the COUPON BELOW—we'll send Skipper's Cap with Ki-Yak!

ONLY $11.75

F.O.B. CHICAGO

REMEMBER: We'll send you MONEY-MAKING Plan and new boat **circular** on receipt of ... **10c**

HOW TO ORDER!

Use the convenient Coupon—follow these simple rules: Send Money-Orders or certified Checks, or currency by registered mail. All prices are F.O.B. Chicago. If you prefer, send 50% with order and we will ship C.O.D. for the balance. Single orders are shipped by Express only. **PLEASE BE SURE TO USE OR ENCLOSE Coupon** to get Cap Free! Do it now—remember . . . you can assemble your KI-YAK for pleasure-profits or **cash-profits!**



"Skipper" Cap

Look — get this handsome "Skipper" **FREE!**

Yachting cap **Free!** A real quality Naval Officer's cap made of fine white duck with glossy black visor, gold braid, and Anchor emblem. Real leather headband. Get **YOURS FREE** by ordering your Ki-yak NOW on the coupon below. Take advantage of this generous offer and get this classy cap without any extra cost.—Act **QUICK**—mark your head-size on coupon—cap comes Free with Ki-Yak Kit!

FREE CAP If You Order KI-YAK on Coupon

MEAD GLIDERS

12 So. Market St., Dept. M-73, Chicago, Ill.

Cash () I enclose $.....; please ship Model K-..... and my FREE "Skipper" Cap, size.....

C.O.D. () I enclose $.....; please ship Model K-..... and FREE cap, size.....; I will pay balance of $..... on arrival, plus small shipping charge.

() I enclose 10c; please send me your Ki-yak circular and details of your MONEY-MAKING PLAN. (This is included with Kit shipments.)

PLEASE PRINT CLEARLY:

Name:.....

Street:.....

City:.....State:.....

MAGIC CHEESE CHIPS

Coast-to-Coast Success!

POSITIVE PROOF OF UP TO $60 TO $300 A WEEK AT HOME



NO HOUSE-TO-HOUSE CANVASSING

Experience Unnecessary--No Costly Machine to Buy

The new coast-to-coast food hit. You work at home, chips come to you already made. Simply drop into hot grease and they're ready to eat! No complicated work, no experience, no failures! Positive proof of opportunity to make up to $30 *first day.* Distributors now making high as $60 to $300 a week clear! Not a machine. No need to buy special equipment. Stores do your selling for you. A phenomenal success! Sells faster than potato chips, do-nuts. Magic Cheese Chips are big, fluffy, giant-size chips bigger than potato chips. Irresistible taste makes them act like an appetizer. The more you eat, the more you want to eat, and you never get filled up! It's a revelation! Nothing like it. Crowds, Maine to California devouring thousands of pounds weekly!

PAYS TREMENDOUS PROFITS!

An enormous profit on a small investment! Everyone likes this tasty tidbit any time of the day. 5 and 10 cent bags of Magic Cheese Chips sell like wildfire. Sales often run up to hundreds of dollars daily.

MEN, WOMEN EVERYWHERE Start at Scratch, Build Up to 1,000 Pound a Month Businesses

Men and women succeed alike—no super-salesmanship—no skill—no canvassing. E. Weiler, California, starts with 10 pounds, uses profits to build up to 30 pounds, then 60 pounds, then places standing order for 150 pounds EVERY THREE DAYS! ALL PAID FOR OUT OF PROFITS! One of the largest bakery chain systems in the U. S. bids for exclusive rights in 200 cities, but we had already allowed exclusive rights to others, except in 9 cities which they grab eagerly. Buy 150 pounds at a clip for each store! J. F. Knudson, living in a small New York city, wires, "RUSH ONE HUNDRED TWENTY POUNDS. OUR TRADE WILL REQUIRE UPWARD OF FIVE HUNDRED POUNDS MONTHLY." Large Pacific Coast concern wires, "INCREASE STANDING ORDER TO ONE HUNDRED FIFTY POUNDS WEEKLY. SHIP TODAY SURE THIRTY POUNDS ADDITIONAL EXPRESS." Long distance calls, telegrams flooding in from everywhere—we've had our plant working twenty-four hours a day to meet the demand! No hard times for MAGIC CHEESE CHIPS!

YOU DON'T INVEST A RED CENT

until you have sold yourself on the possibilities. You must sell yourself first before we permit you to invest, and our novel plan enables you to decide without cost! Then you can start with $8.50 investment, put back the enormous profits, building up without another penny investment if you wish!

EVERYTHING FURNISHED

We furnish everything—advertising, display stands, etc. Don't wait until it's too late to get the FIRST BIG PROFITS in *your* locality. Mail the coupon at once for complete details and share the enormous profits immediately!

FLUFF-O MFG. CO. Dept. 2015-G St. Louis, Mo.

NEW NOW!

The Smash Hit of the day! The big fad at parties, outdoor games. People everywhere munching 'em on the streets! Takes instantly. Biggest food novelty boom in years!

VIRGIN TERRITORY EVERYWHERE

Hundreds of successful businesses now operating. Thousands of open territories. Hundreds of cities open—thousands of small towns. Immediate success possible anywhere. Write today.

SEND for ACTUAL PHOTO-COPIES of ORDERS from MAGIC CHIP DEALERS

Bonafide Proof of Profits!

See the actual orders with which men and women with small capital start, then see the orders they send out of profits! No claims. We let the facts speak for themselves. Look into this now while you have FIRST CHANCE at the profits in your locality. No obligation. Mail the coupon immediately—later may be too late.



MAIL FOR COMPLETE DETAILS

FLUFF-O MFG. CO.
Dept. 2015-G
St. Louis, Mo.

Without obligation to me, rush full information at once about Magic Cheese Chips and your proposition where I can make up to $60 to $300 a week at home.

Name

Address

.....

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Science News Notes of the MONTH

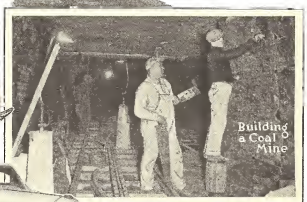


Impressive-looking streamlined car built over small chassis by F. B. Bergholt, showing what amateurs can do in modernistic body-building. It was hand-fashioned.



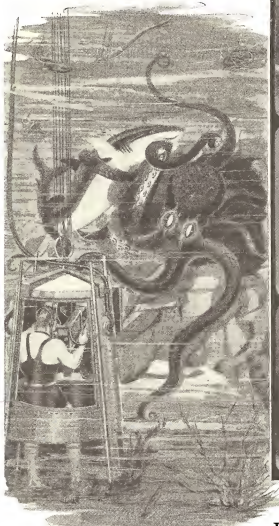
Russians Seek to Outdo Piccard

Soviet scientists will make balloon stratosphere ascent this month, striving to outdo Piccard. The elongated gondola is of steel, hermetically sealed.



Building a Coal Mine

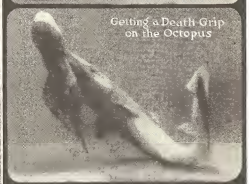
Chicago has the only indoor coal mine in the world. Its arrangement in the Rosenwald Museum was described in these pages some weeks ago. Construction has now advanced far enough to picture the results. Workmen are shown above putting a "veneer" of coal in place, just as nature built the vein in an Illinois mine.



Shark-Octopus Undersea Battle Filmed

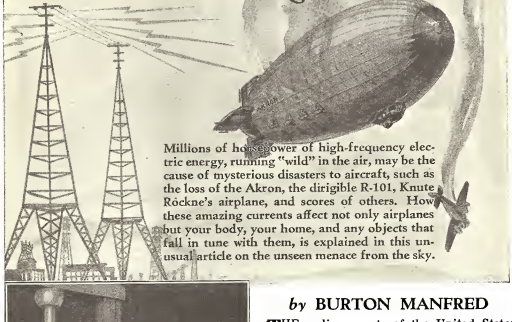
A most remarkable battle between a shark and an octopus has been photographed by a daring cameraman for the film, "Samarang"—(Out of the Deep). With his camera and equipment inside a diving bell, open at the bottom, the internal air pressure being sufficient to keep the water out at shallow depths, he placed a piece of meat in the water to attract the shark, the octopus already being in the vicinity. The battle which ensued between shark and octopus lasted twenty minutes, but it was quite one-sided. The shark swung into attack from below, as shown in one of the pictures, getting a death grip which is never relinquished until the helpless victim succumbs. The shark was of the tiger variety. The bottle was staged in comparatively shallow water to allow of sufficient light for recording the extraordinary scenes. The battle winds up with the shark dining off one of the tentacles of his foe.





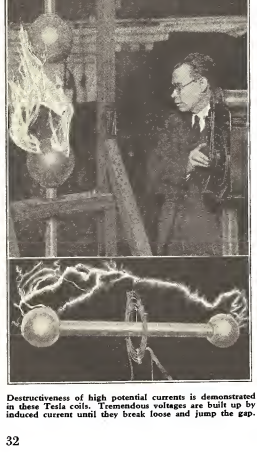


Do WILD Radio Waves Cause AIR DISASTERS?



Millions of horsepower of high-frequency electric energy, running "wild" in the air, may be the cause of mysterious disasters to aircraft, such as the loss of the Akron, the dirigible R-101, Knute Rockne's airplane, and scores of others. How these amazing currents affect not only airplanes but your body, your home, and any objects that fall in tune with them, is explained in this unusual article on the unseen menace from the sky.

by **BURTON MANFRED**



Destructiveness of high potential currents is demonstrated in these Tesla coils. Tremendous voltages are built up by induced current until they break loose and jump the gap.

THE radio experts of the United States Navy have recently completed a series of astounding experiments, experiments that prove far beyond the shadow of human error that there is a new menace in the sky. Hour after hour, day after day countless thousands of horsepower of high-frequency electric energy is being pumped into the air by great radio stations and other high-frequency machinery which has become a part of our civilization.

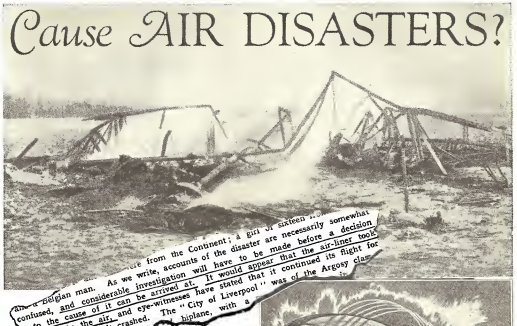
Only an infinitesimal speck of this prodigious output of energy is consumed by the radio receivers of the world. What happens to the rest? Does it become a wild and roving source of death and destruction or does it rush into the frigid voids of space never to return to the earth?

What Happens to Wild Energy?

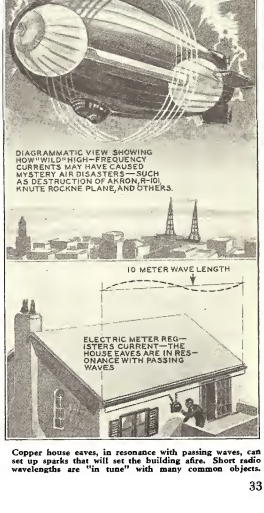
Engineers have found that it does both, great quantities of it being absorbed by living and inanimate objects and in these objects it is detectable as surging forces of electric current. Even the man-in-the-street absorbs a part of this energy and the tissues of his body are seats of tiny electric currents in tune with the powerful broadcast transmitters of the land.

It is only when these wild waves reach large metal structures, however, that danger develops. In such structures electric currents often reaching a potential of several thousands of volts are generated and sparks or discharges may be produced that will cause fire or explosion.

These new discoveries of radio engineers naturally bring up the subject of the mysterious airplane and sea accidents that have gone unsolved during the past few years. What of the Naval collier *Cyclops* that was swallowed up by the sea? Was it a victim of its own radio transmitter and did these powerful fugitive currents cause an explosion on board that obliterated it from the face of the world?



Recent example of an airplane crash whose cause remains an official mystery, as indicated by newspaper account, is that of the "City of Liverpool," crack multi-engined plane on London-Continental service. Note that it "apparently took fire in the air"—a circumstance which may well have been caused by wild radio waves through high-frequency induction. In the column at right, the phantom view of a Tesla coil, superimposed over the dirigible, indicates how high potentials can be built up in metal framework of such ships as the Akron until a point of destruction is reached.



Copper house eaves, in resonance with passing waves, can set up sparks that will set the building afire. Short radio wavelengths are "in tune" with many common objects.

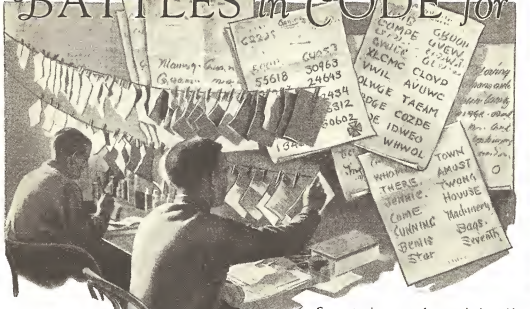
Mysterious Airplane Accidents

We have the same right to put the same question in connection with a number of very mysterious airplane accidents that have occurred during the past few years, notably the one in which the famous and lamented coach, Knute Rockne, was killed. The airplane is particularly susceptible because of the inevitable gasoline tank. Sparks by induced current at this point will be found to produce fatal results if the ship is afloat.

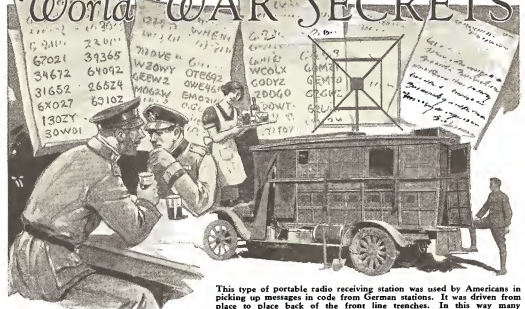
It has long since been known also that large steel buildings in the vicinity of broadcasting stations suck in tremendous quantities of this energy and that they become veritable electric dynamos. So potent does this radiation become that small electric lights may be lit by wireless under the antennae systems of large radio stations.

Most recent of those which come to mind is the disaster of the dirigible *Akron*, the precise cause of whose collapse into the At-

BATTLES in CODE for World WAR SECRETS



Censors treating suspected communications with chemicals during the World War to bring out secret inks which may have been used by spies.



This type of portable radio receiving station was used by Americans in picking up messages in code from German stations. It was driven from place to place back of the front line trenches. In this way many German codes were solved and secrets of the war lords ferreted out.

by THOMAS M. JOHNSON

Amazing secret battles of spies and cipher experts, involving the use of codes and cryptograms on which hung the lives of millions of men in the trenches, played a vital part in determining the course of the World War. Kept secret for years in confidential archives, some of the startling exploits of American cryptographers are brought to light here.

"THE enemy has our secret code!"

The dread tidings were whispered through the corridors of Washington; War Department, State Department, even the White House. They brought a cold chill of fear. Could it be that at the climax of the greatest fighting effort in our history, the Germans were reading our leaders' most confidential messages, knew their inmost thoughts and plans? We must stop that, at once.

So in that thrilling summer of 1918, a hidden combat raged unknown, between the code and the cipher experts of the German and American secret services. The battlegrounds were official Washington, hostile Mexico, European neutral countries rotten with intrigue, in the air, under the sea, in the bowels of the earth—the trenches. Everywhere, the Germans struggled to find out our plans to hurl our million fresh troops into battle; everywhere, we struggled to conceal those plans. No wonder, when from our own secret service had come this report:

"The Germans got our secret code from a spy—a spy, and in our own code and cipher room, here in Washington!"

Our own code and cipher room, an inner recess of the massive brick building, secluded, safe, that housed the best brains of the Army War College. Here, by patient work, we had assembled the cleverest of American experts in this occult science of hiding the most important orders, plans, policies beneath a puzzling string of numbers or strange symbols.

Aided by records and paraphernalia brought from the secret department of Col. George Fabyan's Riverbank Laboratory outside Chicago, they compiled codes and ciphers to mask our confidential communications over the network of cables and telegraph lines that covered the world, and even through the air itself, by radio. These men held their country at their mercy—if one of them turned traitor—

A Spy in the Cipher Room!

No wonder strong faces paled, when a few of our leaders heard, in strictest confidence, the strange story a strange man had told General Marlborough Churchill, then chief of our Military Intelligence Service. This man, who came secretly by night, was one of the cleverest American spies in the World War. Unknown, he played a large part in preventing invasion of Texas by Germans and Mexicans. This time, he had come straight from the German spies' nest in Mexico City, bearing a photograph that he had stolen.

It was a photograph of a man with a German name, who was then a trusted cryptographer in the American code and cipher room in the Army War College in Washington. He was one of the trusted men who composed the codes and ciphers in which our important messages were to be concealed, and to whom were handed over similar messages sent by German officials, secret agents or spies, that had come into our hands and must be solved correctly and honestly. But now!

"There's your leak!" cried the man from Mexico.

In a Nest of Spies

He was Dr. Paul Bernardo Altendorf, an Austrian, turned American. Posing as a German-American draft dodger, he had gone boldly to Mexico City, wormed his way into the group of desperadoes, bombmakers, incendiaries that German Minister Eckhardt had working against the United States. He even lured one of them, the famous Pablo Waberski, across the border into Texas, to be captured by the Americans and sentenced to death. Then, with cold courage, Altendorf had turned around and returned to Mexico, where, if his trick were known, his life would not be worth one peso. But he wanted to keep a date there with Kurt Jahncke, German Master Spy, who is now a member of the Prussian Diet.

The date was at the apartment of an attractive German-American woman, who had assembled the choicest of Jahncke's spies and saboteurs, who boasted they would slit the throat of any dirty American spy. Altendorf made himself agreeable, sauntering about, admiring the apartment's decorations. This admiration led him to recesses.

Suddenly he stopped, amazed. Before him was a photograph of a man he had seen before—before—but where? Ah—in Washington! But where, in Washington? And how?

A step sounded in the passage. Altendorf wheeled about.

"Ah, Senora," he exclaimed. "Pardon that I withdrew a moment, led astray by these tasteful decorations. So many interesting things! Now, who is this man so handsome—though in *your* apartment, he could be only handsome!"

Disarmed, his hostess blushed, then said, "That is my friend, Rudolph Metz."

Tracking Down a Suspect

Rudolph Metz! That was the name, Altendorf exulted. Rudolph Metz—Washington—ah, the Army War College! The room where the code and cipher men did their secluded, vital work! Yet among these picked men, supposedly trustworthy until death, he had seen this man—who was the "friend" of a notorious German spy! He managed more gallant speeches as he sauntered back with his hostess—having noted that, outside the window, was a balcony.

An hour later, the American spy dropped quietly from that balcony, and flitted away in the Mexican darkness. Beneath his coat, he clutched the photograph of Rudolph Metz.

That story sent General Churchill hurrying to the code and cipher room.

"Why, Metz was sent to us by a woman," they told him. "A woman member of our

I Learned About LIONS by "GROWING" Them

by CHARLES GAY of the Gay Lion Farms

A lion has less intelligence than a mongrel dog. Captive-bred lions are more dangerous than their jungle-born brothers. The King of Beasts' disposition is never to be counted on. These are some of the disillusioning facts which Mr. Gay, who for nine years has bred captive animals in his famous Gay Lion Farm, has learned about Mr. and Mrs. Leo. His article is as thrilling as a visit to the zoo.



This contraption, on which lions can sun themselves, was built by Mr. Gay after observing that in his native Africa the lion has a habit of lying in the sun atop a termite mound.

IN SURROUNDINGS totally unlike those to which their jungle relatives are accustomed, my 219 African lions—ranging in age from a few days to 17 years—are bred, reared, and in some cases trained for particular public exhibit.

The most brilliant lion, I have learned during a decade spent in this queer business, displays less intelligence than the commonest dog. Lions face a wire barrier and accept their captivity without question, seeking neither to climb up nor to burrow under toward freedom. Dogs, on the other hand, will make strenuous efforts to escape from imprisonment.

Yet no animal receives greater public adulation than lions. Their great, tawny heads shake; they emit ear-splitting roars; they apparently fight with trainers. Behind their usually calm eyes lurks great, and sometimes immediate, danger. They are ferocious beasts.

Oddly, those born and bred in captivity present greater threats to trainers than do jungle-born lions. Why? Because the jungle-bred lion, not having known humans in youth, fears and respects his master when at last they are brought in contact.



Two lion cubs, four months old, observing visitors. They look innocent now—but wait until they're four years old!

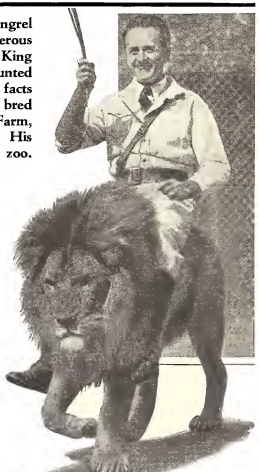
On the other hand, captive-born lions usually are petted during babyhood. Everyone knows that familiarity breeds contempt. Nowhere is this more true than in our relationship with these magnificent beasts.

Behind the danger that is constantly present stands this one fact: the lion, no matter where, when and how born, is a wild animal. He always will be wild. He passes from babyhood at three years to the full-grown lion stage. After that, look out!

I have heard many people say that roaring lions in a circus performance are merely showing off when they snarl and snap at their trainer. In a measure, this is true. Yet if you will examine the history of lion trainers, you will find that the best of them frequently look up at a hospital ceiling, lying in bed while nursing wounds inflicted in a moment of carelessness or rage on the part of some more-or-less trusted animal.

Nearly all the lions you see in "acts" were born in captivity. There is good reason for that. Not only can circus owners purchase "home-grown" lions cheaper, but they also get healthier and more handsome animals.

Normally a good specimen costs $1,000. The price varies with age and appearance. Were we able to diagnose their future demeanor in the big cage, we could charge higher prices for some, while others would be given away merely to get them out of our sight.



Mr. Gay aboard Pluto, one of his favorite full-grown animals.



Little Leo regards himself in the mirror with some belligerence. The petting to which such cubs are treated when youngsters results in a familiarity with humans which may result more or less dangerously at a later age.

These two cubs will be worth around $1000 apiece when they grow up, depending on their appearance and dispositions.

How OKLAHOMA AGENTS Put HOT OIL ON the SPOT



The pipe in the background of this photo is a secret flow line from an oil separator, snaking along past the tanks where oil is usually deposited after being metered to a pipe line. In this way operators avoided gauges at lease storage.

by ERNEST W. FAIR

"Hot Oil," in the language of the oil fields, is stolen petroleum. A gigantic conspiracy among unscrupulous producers to loot the restricted Oklahoma fields of their black gold, through such elaborate mechanical methods as secret pumps, buried pipes, hollow cores in shut-off valves, etc., has just been uncovered by Oklahoma militiamen. A complete exposure of amazing secret methods is made in this gripping article.

SEVEN million barrels of oil "stolen"!

The far-flung rackets of illicit oil producers of the great Oklahoma City oil field, one of the largest in the world, make the activities of Chicago's racketeers seem like children's games. The Teapot Dome scandal dwindles to insignificance in comparison with this Three Million Dollar swindle of royalty owners, producers, and even the sovereign state of Oklahoma itself.

Far into Canada where the "hot oil" rings bartered for the sale of Oklahoma's illicitly produced resources, to the Gulf of Mexico where mighty tankers stood ready to carry the crude to foreign countries, the ramifications of the crooked syndicate spread.

Secret Traffic in Black Gold

For months the oil flowed through hidden pipes, glided noiselessly past valves with hollow cores, sped into pumping stations buried deep in the ground and finally arrived at waiting carriers where it was sent to market.

In less than a year 7,000,000 known barrels of this oil were stolen. Yet investigators under Lieut. Col. Cicero I. Murray admit that millions more remain yet to be discovered.

Hundreds of thousands of dollars were swindled from royalty and property owners . . . tax revenue that might have enabled Oklahoma to free its citizens of advalorem taxes remained unpaid and last, but by no means least, more than $2,500,000 worth of oil was stolen from the pools of honest producers who remained almost helpless.

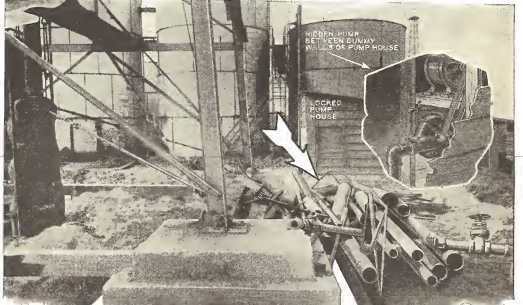
Oil basins resemble a great oat bin with many outlets. If all openings remain open each will flow an equal amount of the contents of the bin to waiting containers. But should one section be opened and all others closed the one outlet will soon drain the entire bin of all the oats.

Thus on every pool of oil there are many wells, each draining the precious black gold from a common source. If some are closed and others remain open the closed wells lose their rightful share of the crude in the pool.

So the "hot oil" wells, running against military orders and gentlemen's agreements among producers, drained the field. Before we can clearly understand the amazing theft of a fortune in oil we must consider the causes that brought the condition making this theft possible into existence.

Why the Wells Were Restricted

Three years ago the oil markets of the world were flooded with petroleum. New fields kept coming in. There was more oil to be sold than buyers could purchase. The price crept slowly downward . . . the old law of supply and demand was in operation.



In the pumphouse of this well secret pumps were hidden between dummy walls, and cleverly connected with switches so that when the door was opened the pumps would automatically cease running. The arrow points to a mass of pipes in foreground which conceal the valve used to regulate oil flow from the pump.

Royalties are based on a percentage of the selling price of the oil; so too are state gross production taxes. As prices came tumbling down so also went not only profits to producers but royalties to oil owners and taxes to the state.

The state of Oklahoma saw its natural resources being thrown away. From $4 a barrel the price dropped to $2 and finally to $1.

And then one of the largest fields ever discovered came in . . . the new Oklahoma City field with undreamed of quantities of the highest grade crude gushing across the tops of the giant derricks.

The new flood of oil sent prices even lower. So proration was born. Under its rulings the oil buyers came to the Oklahoma state corporation commission each month. They told how many barrels of oil they would take at the current price. Governor William H. Murray had closed every well in the state by executive order, placed them under the guidance of a field umpire. The Corporation Commission divided the orders among the wells and each was allowed to produce only its share.

Thus with the birth of proration the nefarious plans of the crooked oil producers began to ferment.

At first all went well. Then came a mighty flood of oil from a new field in East Texas sending prices downward beyond control. Producers chafed under the rulings that held their production down. Some ran their wells in open defiance of the commission allotments so that they might sell the crude at any price.

Martial Law Clamped Down

Once more Governor Murray acted. He placed the fields under martial law, ordering his cousin Lieut.-Col. Cicero I. Murray to take charge.

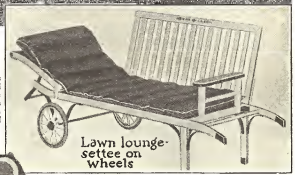
Honest producers found their wells weakening . . . they knew that somewhere in the field someone was producing oil illegally . . . the market reports showed clearly that more oil was coming onto the market than records showed had been produced.

Mechanical Aids Remove Drudgery from Housework

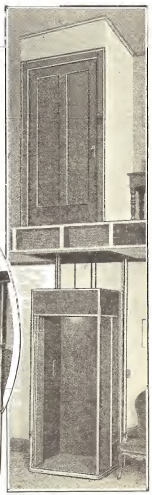


Cocoanut shredder

Fresh cocoanuts may be shredded with complete safety to hands by use of this new household utensil.



Combination lawn lounge and settee can be wheeled to any part of lawn or beach. Does duty also as convalescent chair.



Home elevator



Ideal for the bed-ridden is this two-legged table, suitable for use as a card table, bed table, tilted book rest, etc. Legs are adjustable to bring top to any height and angle desired.

Last word in convenience is found in home elevator, adaptable to any house. Lifts 350 lbs., and has adequate safeguards. Operated and controlled by wall switch.



Home intercommunicating system

No longer is it necessary to waste energy to make trips to other parts of the house, office, factory, to talk to someone. This home intercommunicating system carries your voice clear and loud to party you wish to speak to. Adaptable to front door installation, as shown.



Electric wiener roaster has metal points to hold the "dogs" in place. Current thus enters wieners, roasting them deliciously in 60 seconds.

Electric weiner toaster



Insect exterminator

Cockroaches, ants, flies, mosquitoes, etc., have high mortality rate when in vicinity of this electric exterminator.



By pushing down on nipple of this new pump placed over milk bottle, cream is forced from the spout, leaving the milk undisturbed. Adjustable to take any amount of cream.

CLOWN ALLEY



Stilts are an ancient but always effective piece of clown property. In the photo above is shown a stepladder effect graduating upward from a midget to a thirteen-footer.

BACK of the big top, in the men's dressing tent, is "Clown Alley," a peripatetic lane of trunks that have been set down in half the big vacant lots in the cities of North America.

Here, amidst a heterogeneous background of portable costume racks, grease-paint containers, clown motley, canvas chairs and painted buckets are the doctors of mirthology, answering a seemingly endless procession of cues; contributing their bit to the brilliant mosaic of the circus performance.

Here, in this bizarre setting of huge, varicolored trousers, flapping artificial feet, fiery wigs and ridiculous hats walk the ghosts of Jules Turnour, Al Miaco, Billy Wallet, Dan Costello, John Lowlow, Bill Gardner, Joe Pentland, Johnny Patterson and the inimitable Dan Rice whose name had a magic quality that transcended even Barnum's when our grandfathers were going to circuses.

But the "mechanics" of clowning have changed decidedly since the days of Dan Rice. He belonged to the old school of talking and singing clowns, any one of whom could monopolize the entire tent of the old one-ring shows. Today, the largest circuses present their buffoons in regiments and the ambassadors of glee must compete with virtually everything else the circus has to offer.



Every circus must have one or more clowns of an inventive turn of mind to produce mechanical fun-makers such as the well-known hot dog machine shown here, and others.

The art of the jester hasn't deteriorated with the advance of the times. Indeed, it has reached an even loftier level. Clowns of the present era must be able to make a swift, effective impression; get their laughs and retire gracefully. And have you noticed that a circus performance is a pretty fancy piece of mechanism? The time required to run it off does not vary five minutes day after day.

Each time the equestrian director (or ringmaster) blows his whistle the entire panorama changes. A tent filled with animal acts will give way to a bevy of aerialists and the band will switch suddenly from gallop-time to waltz tempo. There seems to be no intermission, however brief, during the progress of the program. Why? Because of the clowns. They fill the so-called "dead spots" that occur between the moment one army of performers quits the arena and the moment another series of acts begins or while property men are setting the rigging for certain featured acts.

But to the spectator there is no "dead spot" in the procession of wonders, so adroitly are the clowns sandwiched between the seemingly endless layers of circus talent. There is a lot of psychology in the building of a good circus bill-of-fare. For example, clown numbers may be spotted to advantage right after some particularly hazardous aerial routine that has the crowd keyed up in an atmosphere of nervous suspense. The sudden appearance of the circus fun-makers at the conclusion of such an act allows the audience to relax.

A prevalent method of "filling in" is the clown "walk-around," which means that each stunt is repeated six or seven times as the mirth-provokers work their way around the hippodrome oval both singly and in groups. The singing and talking buffoons of our grandfathers' day would be lost and bewildered in the big top of America's biggest amusement enterprize with its seven rings and its eleven tons of canvas that

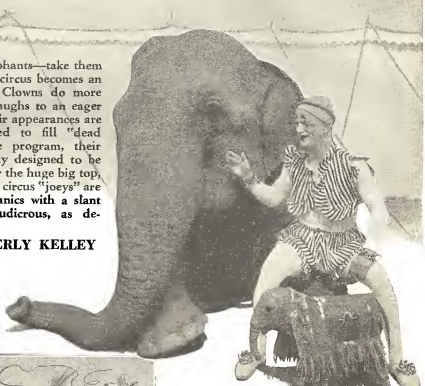
LANE of LAUGHS

Clowns 'n elephants—take them away and the circus becomes an empty shell. Clowns do more than supply laughs to an eager audience. Their appearances are carefully timed to fill "dead spots" in the program, their stunts carefully designed to be effective under the huge big top, and altogether circus "joeys" are **creative mechanics with a slant toward the ludicrous, as described here**

by **F. BEVERLY KELLEY**



"Trick" clowns, as distinguished from the mechanical type, ape the acts and mannerisms of fellow big-top actors or of well-known characters and depend on pantomime for effect.

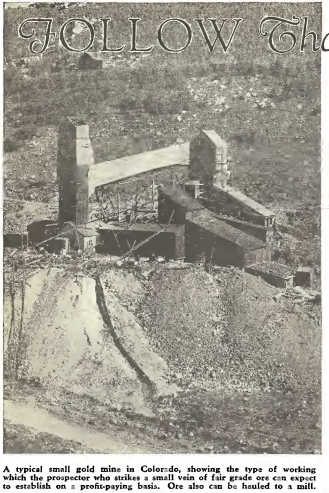


A sure-fire laugh-getter—a dog dressed up like an elephant. "Joey" is explaining to pouting Jumbo that it's all in fun.

FOLLOW That GOLD to Find the VEIN

by ARTHUR HAWTHORNE CARHART

In this, the final installment of the series of articles on how present-day prospectors get gold out of the hills, which began in the April issue of Modern Mechanix and Inventions, Mr. Carhart tells how to locate lodes from which placer gold originates and describes machinery which enables deposits of low-grade ore to be worked profitably.



A typical small gold mine in Colorado, showing the type of working which the prospector who strikes a small vein of fair grade ore can expect to establish on a profit-paying basis. Ore also can be hauled to a mill.

EVERY particle of placer gold comes from the weathering of an outcropping vein somewhere up stream.

The vein may be beside the creek, or high on a cliff. It may be masked by talus, or it may be in plain sight. It may be wide or narrow, rich or poor, but somewhere, up-valley, where gravity carries it to the stream, and the stream then washes it down the channel, is a vein of gold ore.

A miner who limits himself to placers exclusively, because of low cost in production, may be barring himself from a fortune. Placer gold is diluted with every sort of materials from every slope in the drainage basin. Therefore, if there is sufficient gold coming from the vein to show in this diluted form, the gold in the vein must be fairly rich.

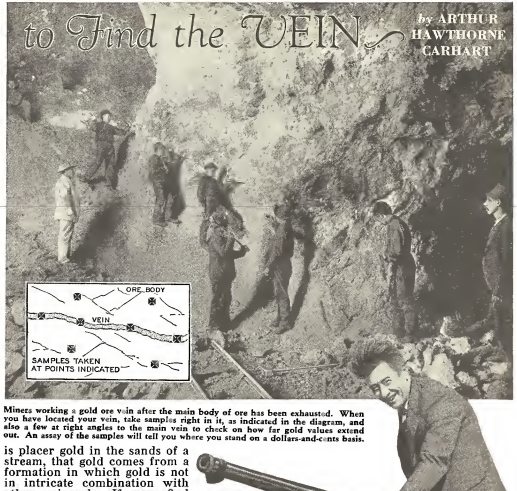
The locating of the lode from which placer gold originates is the next logical step for any miner who is out to find gold regardless of where it may be located and in what form it is found. Even a placer that shows scant gold values may be getting that gold from a vein that is rich. Or, as in the case of many gulches, the old timers have worked out all coarse placer gold, until there is nothing left except the finer gold. Often these pioneers stripped the placers, then hurried on to other easy gold; or they hunted for and missed the vein from which placer gold originated.

If there are a number of existing mines up canyon this may indicate that the veins, that have been cut out by the stream in the canyon, have been located. It does not positively prove that all of them are located. But a gulch showing a trace of gold and no mines above may have been stripped of its heavier gold, and there may still be undiscovered veins at the head of such a gulch waiting for modern prospectors.

By panning up stream at regular intervals the prospector finds that at some point gold ceases to appear in the pan. Or he may be finding two kinds of gold at first, one rough showing it has not been water-carried any great distance, the other flat, smooth particles indicating they have been washed from distant sources. Then the rough gold ceases to appear. By panning back and forth just below that point, the approximate point of entry of that rough gold may be located. The next step is systematic sampling and searching of the slopes until the streak of gold-bearing talus is found. Above that will be the outcropping.

Hard rock miners will tell you to be on the lookout for quartz. It is not positive evidence of gold-bearing rock but it is an indication. Sometimes pannings in the stream will wash out bits of quartz flecked with free gold. In that case look for a gold-bearing quartz vein.

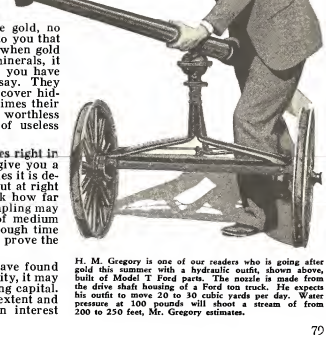
It is an axiom of miners that where there is placer gold in the sands of a stream, that gold comes from a formation in which gold is not in intricate combination with other minerals. If you find quartz shot through with native gold, no expert will be needed to prove to you that you've found it. But sometimes when gold is in combination with other minerals, it is hidden. So do not quit until you have proven the outcrop. Get an assay. They cost about fifty cents. If they uncover hidden gold they are worth many times their cost; if they prove you have worthless property, they save you days of useless work.



Miners working a gold ore vein after the main body of ore has been exhausted. When you have located your vein, take samples right in it, as indicated in the diagram, and also a few at right angles to the main vein to check on how far gold values extend out. An assay of the samples will tell you where you stand on a dollars-and-cents basis.

Locate your vein. Take samples right in it. An average of these should give you a measure of its richness. Sometimes it is desirable to take a sample or two out at right angles to the main vein to check how far gold values extend out. Such sampling may uncover considerable deposits of medium or low grade ore. But spend enough time and the little money necessary to prove the prospect.

If the assays show that you have found only low grade ore but in a quantity, it may be a milling proposition, requiring capital. In that case you would prove its extent and values by adequate testing, then interest



H. M. Gregory is one of our readers who is going after gold this summer with a hydraulic outfit, shown above, built of Model T Ford parts. The nozzle is made from the drive shaft housing of a Ford ton truck. He expects his outfit to move 20 to 30 cubic yards per day. Water pressure at 100 pounds will shoot a stream of from 200 to 250 feet, Mr. Gregory estimates.

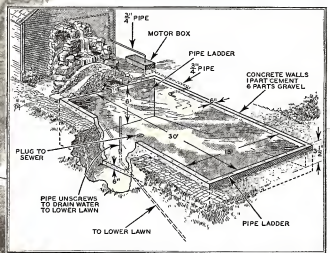
REVISED EDITIONS *of* "Ye Olde Swimming Hole"



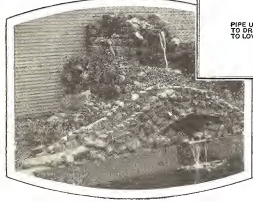
The Studnicka pool has rock seats and generous walks along the side.



Here is washing machine motor and centrifugal pump which sucks up the water in the pool and delivers it to the falls.



This shows layout of Studnicka pool mentioned by Dale Van Horn in his accompanying text. The water is dosed with chloride of lime to prevent formation of green algae.



This rock garden and waterfall was built at one end of the pool shown above in order to properly circulate the water.

by DALE VAN HORN

"OR TAKE the case of Jim," my friend continued. "Jim planned for several years to make a trip back to his boyhood home. He longed to hang his clothes on a limb and sport about in the old swimming hole. His plans finally materialized. He could scarcely wait. Doing as of old, he disrobed, poised for a moment on the bank, then dove in. Up came a disheveled person spitting mud. Slime ran down his face, out his ears, through his hair. Climbing out he cut his foot on a broken bottle.

"That trip cost Jim around $120. Hurrying home, he still had time enough to put a small pool in his back yard before his vacation was up. And now he desires nothing more than frequent dips in this manmade affair, lacking mud banks and a genuine naturalness perhaps, but devoid of slime, mud and sharp things on the bottom," my friend concluded. Later I found that Jim was no other than the narrator.

Backyard pools are growing in popularity and this spring will see thousands of such retreats built in devious shapes and sizes on as many back lots. If you think such a layout is prohibitive in cost and requiring too much space, you are mistaken. For I am not talking, folks, of a country club pool, or the pool back of the Ritz. To quickly comprehend, take a glance at the pictures herewith, then if you enthuse, read on.

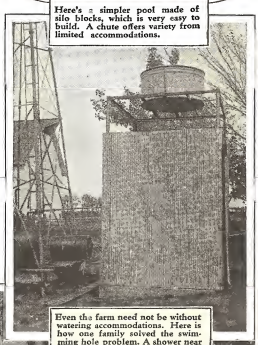
To be specific, here's the case of the W. E. Studnicka pool. Thirty feet long, 14 feet wide, it has circulating water at the turning of an electric switch. The walls and bottom are of concrete 6 inches thick. Plenty of reinforcing at the corners have held this wall through four useful summers and as many severe winters—without cracking. This pool, built largely that a daughter Marcella might build up physically, lies behind the family garage. Abutting against the rear of the building is an archway of typical field stones—glacial rocks—which is the east beginning of a tumult of more rocks, planned with careless precision. For it is over this vast array of stones and mortar that the water from the pool is pumped, over and over again, to keep it circulating and to properly aerate it. First the water empties from a short pipe protruding through the garage wall. It splashes and falls from the top of the archway down to a small pool perhaps 12 inches across. From here it trickles over and around more rocks, reaches another tiny pool and from there rushes under the cobble stone arched bridge and into the pool itself in another miniature waterfall.

This particular pool of the Studnicka's is set in compact clay and so no outer forms were required down to the bottom. However, both outside and inside forms should be used if the soil is apt to cave or is loose. And in any event outer forms should be used to a foot below the ground line. If both inside and outside forms are used throughout, the simplest method is to mere-

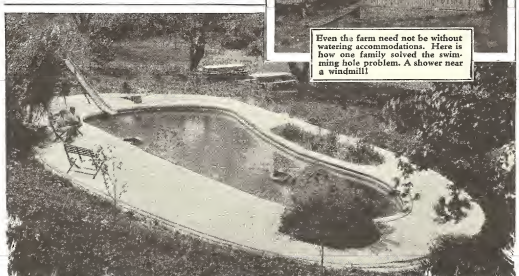
(Continued on page 124)



Here's a simpler pool made of silo blocks, which is very easy to build. A chute offers variety from limited accommodations.



Even the farm need not be without watering accommodations. Here is how one family solved the swimming hole problem. A shower near a windmill!



If the yard affords the room, a pool like this can be built for less than a hundred dollars, contrary to popular belief.

HOME MADE Water Wheel Gives One-half H. P.

Widespread interest among readers concerning building of water wheels unearths this unique adaptation of old farm implements which is floated in place, sunk with rock, giving an undershot wheel of ½ h. p.



Two Montana readers of Modern Mechanic and Inventions show how they meet the problem of extracting power from a nearby stream.

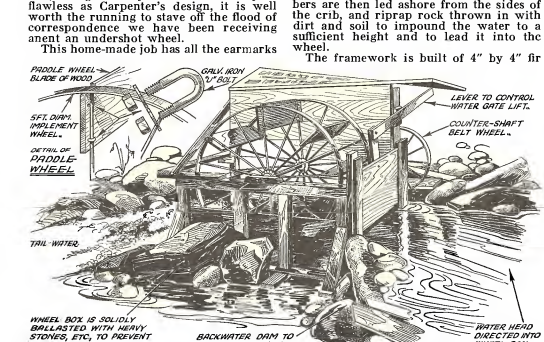
MANY readers of M-M live in communities in which a stream of some sort winds its turbulent way. For a long time we have been referring querents to manufacturers of small water power equipment, and finally we ran an article by John S. Carpenter, hydraulic engineer, on the making of an overshot wheel. This was a real little job, capable of about 1 h. p., and was highly popular with our readers. Mr. Carpenter has other projects afoot, of which more anon.

Two readers out in Montana have built an undershot wheel which captures some of the latent power in a local stream that was formerly going to waste.

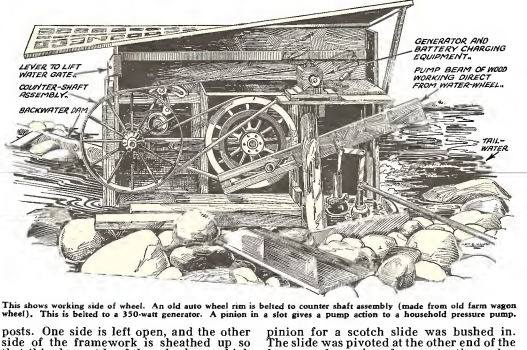
Their version of the wheel is interesting and, though it may not be technically so flawless as Carpenter's design, it is well worth the running to stave off the flood of correspondence we have been receiving anent an undershot wheel.

This home-made job has all the earmarks of hard boiled practicality. It is built in a shop out of odds and ends and then is lowered into the bed of the stream, anchored by a crib work of rocks, and forms the foundation for the dam itself, for timbers are then led ashore from the sides of the crib, and riprap rock thrown in with dirt and soil to impound the water to a sufficient height and to lead it into the wheel.

The framework is built of 4" by 4" fir posts. One side is left open, and the other side of the framework is sheathed up so that this shore side of the wheel, on which the pulleys and the driven machinery are housed, shall not be subject to all the splashing which the wheel throws about. An old tin sign is hung over this machinery to further shield it from rain. Water, you know, is injurious to belting.



This shows how the crib is made, how the cultivator wheels are made into undershot paddles, and how the washboard keeps the water from splashing on the machinery. The warped piece of metal is simply an old sign propped in place to keep rain off the working parts such as belt, dynamo, and the countershaft.



This shows working side of wheel. An old auto wheel rim is belted to counter shaft assembly (made from old farm wagon wheel). This is belted to a 350-watt generator. A pinion in a slot gives a pump action to a household pressure pump.

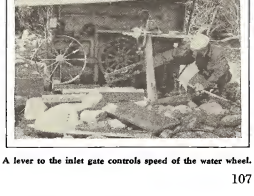
The wheel was also made to pump water for household needs in the following manner.

An auxiliary face or rim wad screwed onto the spokes of the auto wheel, and a pinion for a scotch slide was bushed in. The slide was pivoted at the other end of the frame, and a series of compensating yokes was put into play on the business end of a force pump. The water for the pump was taken from the headwater, this being the clearest.

The delivery was piped to a gravity tank where it was impounded for further use.

A sliding gate was put into the crib at the headwater. This was used to regulate the speed of the wheel, and the delivery of current and water.

It is estimated that the wheel delivers about ½ h. p. as it drives a 350 watt generator (746 watts equals a horsepower), and also has "steam" enough to pump water besides.



A lever to the inlet gate controls speed of the water wheel.

The wheel box is made of hard wood and is sheathed with galvanized iron. The bearings, and on the machinery side of the wheel the axle runs through the sheathing and in any convenient manner is fastened to an old auto wheel. The beam on which this bearing rests for the driving shaft is also the beam which carries another bearing for a counter shaft. The front wheel of an old farm wagon in this instance made a fine counter pulley and a belt was led from its rim to a 350 watt d.c. generator, which some distance away charged a shelf of batteries.

Unique Model AIRPLANE Teaches You HOW to FLY

Sitting in "cockpit" of this model plane, your hands grasping the "stick" and your feet on the rudder bar, you can take off and land, ascend or descend and bank to right or left as if you were in a real plane. A complete flying course turned out right in your own workshop.

by **PAUL R. RANNIE**

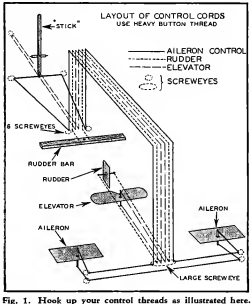


Fig. 1. Hook up your control threads as illustrated here. Note thread to control elevator goes through eye under seat.

WHILE this small airplane will not fly through the air by means of a rubber band motor like the usual model airplanes, it will do things that flying models will not do. It can be maneuvered like a real plane with controls operated in the same manner as those on a real plane.

Pull back on the "stick" and the nose of the model goes up and the plane climbs. Push the stick forward and the plane goes down. Side motion of the stick will bank the plane to the left or right. A rudder bar on which the feet are placed turns the plane from side to side.

All of this is accomplished without the plane moving forward because an electric fan is used to furnish a stream of air. The plane rises from the floor because it is suspended from the end of a balanced lever arm.

The construction will not be found difficult and no special materials such as balsa wood, special paper for wings, etc., are needed.

Construction is illustrated in the drawings. The fuselage is an ordinary piece of wood 12" long. The wing and tail are made of ordinary cardboard. Make the wing perfectly plane, but adjust the ailerons so that both are tipped down a little. This adjustment gives a little better lift. The tin propeller which spins around in the air stream has no function except to give a realistic appearance.

When the plane is suspended by the control cords, the lead weights should balance it so the tail is slightly lower than the nose. The plane is less stable and banks easier if the weights are raised about ¼" above the wing.

Stability is increased by placing some of the weights below the wing. The center screweye which supports the plane and through which the 6 control cords pass should be no more than 2¼" from the front of the wing. Otherwise the plane loses stability.

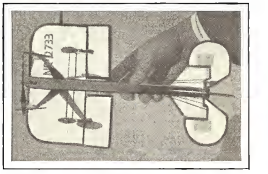
The wing span may be greater than 8" if a large electric fan is used.

To fasten the horns to the ailerons, etc., simply punch a hole through the cardboard, push the horn through and put some glue around the hole.

When constructing the tail, first cut the slot in the fuselage for the vertical stabilizer or fin and glue it in place. Next glue on the two halves of the horizontal stabilizer and attach the elevator. Then mount the rudder with the stove pipe wire as shown.

When folding the cardboard to form the hinges on the tail piece, use a wire or rod larger than the wire that is to be used as a hinge pin when assembled. This will make the hinges work freely. If you paint the model, don't get paint in the hinges.

The control section needs little comment. The lever arm which extends out in front is pivoted on a large wire about No. 10 size. The lever arm is counter-balanced by tin cans filled with sand or scraps of iron. Note the looped wire that is fastened between



Underside view of the plane shows how the tin landing gear is attached to the wood fuselage. Thread from lower horns of ailerons pass through screweyes under the wing.

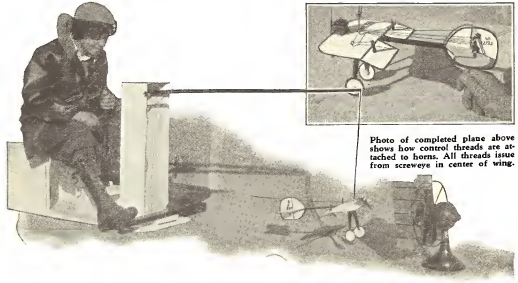


Photo of completed plane above shows how control threads are attached to horns. All threads issue from screweye in center of wing.

The model plane in action. The youthful pilot manipulates ailerons, rudder and elevator as if he were sitting in cockpit of real plane. Note that the fan has a cardboard grid to direct straight stream of air against controls of the plane.

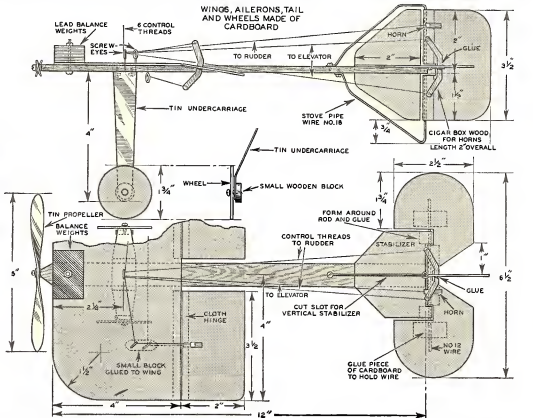
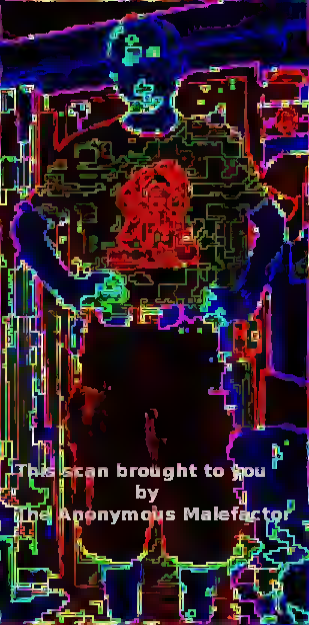


Fig. 2. Details of plane construction will be found here. Wood fuselage must be slotted to take the vertical stabilizer. The ailerons, attached to wing with cloth hinges, should have a slight downward slant. Rudder extends below fuselage.


This scan brought to you
by
the Anonymous Malefactor